THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
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DIESEL RAILWAY TRACTION SUPPLEMENT

The October issue of THE RAILWAY GAZETTE *Supplement, illustrating and describing developments in Diesel Railway Traction, is now ready, price* 1s.

GOODS FOR EXPORT

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as indicating that they are available for export

NOTICE TO SUBSCRIBERS

Consequent on further paper rationing, new subscribers cannot be accepted until further notice. Any applications will be put on a waiting list which will be dealt with in rotation in replacement of subscribers who do not renew their subscriptions

POSTING "THE RAILWAY GAZETTE" OVERSEAS

We would remind our readers that there are many overseas countries to which it is not permissible for private individuals to send printed journals and newspapers. THE RAILWAY GAZETTE *possesses the necessary permit and facilities for such dispatch.*

We would emphasise that copies addressed to places in Great Britain should not be re-directed to places overseas

REDUCTION IN SIZE OF PAGE

To economise in paper our readers will observe a slight reduction in the size of THE RAILWAY GAZETTE *in that the size of the page has been reduced from 9 in. × 12 in. to 8½ in. × 11½ in. The type area of the page remains the same, namely, 7 in. × 10 in., but the surrounding margins have been reduced. This of course detracts from the appearance of the paper, but is one of the exigencies of the war*

TO CALLERS AND TELEPHONERS

Until further notice our office hours are:
Mondays to Fridays 9.30 a.m. till 5 p.m.
The office is closed on Saturdays

ERRORS, PAPER, AND PRINTING

Owing to shortage of staff and altered printing arrangements due to the war, and less time available for proof reading, we ask our readers' indulgence for typographical and other errors they may observe from time to time, also for poorer paper and printing compared with pre-war standards

Advance in Home Railway Stock Prices

A FEATURE of the Stock Exchange recently has been the continued advance in quotations of the stocks of the home railway companies. The result has been to raise some prices to the highest since 1938, and it is interesting to note that the upward movement has been accompanied by a fair volume of business. In view of the fact that the revenues of the four companies are stabilised for the duration of the war and a year afterwards by reason of the financial agreement with the Government for the control of the lines, it is clear that there cannot be much speculation as to the return on home railway investments. It is more likely that investors appreciate the stability of income from home railway securities at the present time, and indeed, in some cases the yields on the stock are a good deal higher than they would be but for apprehension as to changes which may take place in the control of the companies after the war. Even at the higher levels that have now been reached the Great Western ordinary shows a yield in excess of 7¾ per cent., and that on the ordinary stock of the L.M.S.R. is in the region of 8 per cent.; the 4 per cent. 1923 preference stock of this company returns well over 6½ per cent. On the 5 per cent. 1955 preference of the L.N.E.R., 5 per cent. is obtainable, and a yield of 8¼ per cent. attaches to the deferred stock of the Southern Railway. The yields on the senior stocks are necessarily less generous, but it may be considered, of course, that for at least the duration of the financial agreement, the security offered by the junior stocks is no less than that obtainable on equity shares by the majority of industrial companies.

"Transport must be Rationed"

Mr. J. Marchbank, General Secretary of the N.U.R., in his weekly notes in the October 2 issue of *The Railway Review*, discusses under the above heading, the possibility of further and more rigorous restrictions on travel. The Ministry of War Transport is known to have examined the possibility of the travel permit system and to have based its rejection on three grounds, namely, the perplexity of such a system; the claims it would make on man power; and the inconvenience it would cause to those who have to travel on necessary business. Commenting on our suggestion that a rough and ready, but simple means of travel rationing might be based on the use of coupons from the general rationing book, Mr. Marchbank comments that it is not clear to him how this proposal would achieve the object aimed at if it would mean that every holder of a ration book would have a ration of transport, and after all there are multitudes of people in the country who are "stay-at-homes." Admittedly, under a rationing scheme everyone feels it incumbent to use his or her quota of coupons or points, but if our proposal were adopted, the "stay-at-homes" would not *have* to travel as alternatively they could use their points or coupons for some other purpose. In other words, those who feel their journey is so "really necessary" would have to back their opinion by going without some food or clothes.

A Hint to Wage Negotiators

So far the Government has not taken any direct steps towards stabilisation of wages despite the numerous suggestions that have been made to it to the effect that some measure of this kind is necessary if inflation is to be avoided. In the House of Commons on September 29, however, the Chancellor of the Exchequer gave clear warning to all concerned in wage negotiations that the Government would have to reconsider its policy if those concerned with the fixation of wages in industry did not maintain their sense of responsibility for safeguarding national interests. He said that the Government considered that its stabilisation policy set out in July last year had so far proved effective in checking inflation, and it was desired to continue to rely on those concerned with wages negotiations and on arbitration tribunals to handle claims for wage alterations with a full sense of the responsibility which they shared for safeguarding national, and not merely sectional, interests. If that sense of responsibility were to break down the price stabilisation policy which hitherto had been successfully maintained would become impossible and the Government would have to reconsider its policy. In the House of Lords on the next day the Lord Chancellor made a reply in similar terms to peers who criticised the Government for lack of a settled wages policy. He claimed that the Government had deliberately adopted the policy of preserving and strengthening the pre-war joint industrial machinery.

Indian Railway Annuities and the Treasury

An important agreement has been concluded under which in return for the payment by the Government of India of a capital sum of £30,054,250 the British Treasury undertakes to make

available to it sums equal to the instalments of the several sterling railway annuities as and when they fall due. There are now five groups of annuities by means of which the capital stock of the railways concerned was originally purchased by the Government of India and these annuities terminate at varying periods between 1953 and 1957. The earliest purchase was that of the East Indian Railway under an Act of 1879. The Eastern Bengal Railway was the next to be taken over under an Act of 1884, and the next purchase was that of the Scinde, Punjaub & Delhi Railway Company under the powers of an Act of 1886. By the Great Indian Peninsula Railway Purchase Act, 1900, the undertaking of that company was transferred to the State in return for an annuity, and the last purchase by means of an annuity was that of the former Madras Railway Company under the powers of the Madras Railway Annuities Act, 1908. The purchase of the Bombay, Baroda & Central India Railway dates from December 31, 1905, when £154 15s. 5d. per £100 old consolidated stock was paid by the allotment of £26 9s. 9d. new capital stock at par and £133 12s. 6d. India 3 per cent. stock taken at 96 per cent. In none of the recent purchases, namely of the Assam-Bengal, Bengal & North Western, Bengal-Dooars, and Rohilkund & Kumaon Railways, has the annuity policy been followed. Annuities are generally of two classes, "A" and "B," the first representing payment of both capital and interest, and the second of interest, less an amount deducted for sinking fund with a view to eventual replacement of capital, although there is no guarantee that this replacement will be complete at the termination of the annuity. The new agreement does not in any way alter the contractual relationship between the annuitants and the Government of India or the liability of that Government for the payment of the annuities.

Great Western of Brazil Railway

Although the sugar crop carried during the 1940-41 season was some 213,000 tons less than the previous year, this was largely compensated by an increase in general traffic in the "dead" season between crops and by the inauguration of higher tariffs on October 1, 1941. Since July 1, 1941, restrictions have been placed on the use both of private cars and lorries, which should bring additional traffic to the railway. Operative efficiency was satisfactory, as wagon and train-loadings were at the highest points ever reached by the company, and the record ton-kilometrage was accompanied by reductions in locomotive-kilometrage and fuel consumption. Thanks to the prevision of the General Manager, firewood properties have been acquired adjacent to the line, and the fuel position is satisfactory, as firewood now forms 90 per cent. of the total fuel consumption. Results are compared in the accompanying table:—

	1940	1941
Kilometres open	1,637	1,657
Passengers	3,688,182	3,658,035
Tons, goods and livestock	1,980,964	1,750,145
Ton-km., goods and livestock ...	138,599,329	140,155,545
Operating ratio, per cent.	80·73	78·64
	£	£
Passenger receipts	122,538	119,996
Goods traffic receipts	397,245	391,985
Gross receipts	554,036	546,235
Working expenses	447,264	431,460
Net receipts	106,772	114,775

The difficulties in remitting sterling from Brazil have now disappeared and payment of arrears of interest for the half-yearly period ended December 31, 1937, up to a similar period ended December 31, 1939, has, in consequence, been made possible.

First Class Travel

Rumour has recently been rife that first class railway travel on day trains throughout the country will be shortly abolished. These suggestions have elicited a statement from the Ministry of War Transport to the effect that the reports are incorrect. It was on October 6 last year that drastic reductions were made in first class facilities in the London suburban area. As long ago as July 12, 1935, THE RAILWAY GAZETTE published a detailed study of the financial effects of abolishing first class tickets. Consideration was then given to abolition throughout the railways of the country and the conclusion was reached that the direct loss in revenue would be £2,766,000 a year and the total possible economies not more than £1,000,000 a year. The economies included some £600,000 a year from upkeep of seats, about £250,000 in saving of coal since uniformity of seats would probably reduce the weight of trains, and £150,000 for miscellaneous economies such as reduced ticket inspection, less clerical labour, less time occupied in marshalling yards, smaller stocks of carriage equipment, and so forth. On the other hand, in peacetime at all events, the possibility must not be overlooked that a good many first class ticket holders—more particularly suburban dwellers—might well transfer their allegiance from rail to road if denied the relative comfort and seclusion only to be secured by the holder of first class tickets.

The Winter Timetables

It is a matter for satisfaction that despite the most gloomy forecasts as to the probability of substantial train service cuts, the main-line railways are able to plan for yet another war winter a long-distance passenger train service practically unchanged from that of the past summer, apart from the withdrawal of relatively few duplicate trains. A comparison between the train services available in this and in the last war is, indeed, striking. In the 1914-1919 conflict attempts were made until the end of 1916 to maintain a service not greatly inferior in speed to that of pre-war days; but then came the most drastic cuts and decelerations of 1917, almost all restaurant facilities disappeared from the trains, and in order to crowd the passengers into the more infrequent services non-corridor stock was brought into use even for journeys of 200 miles and more. This time the railways had their plans thought out well in advance, and as a result, and with the help of more adequate locomotive power in 1942 than in 1917, they have been able to stav the course with a great deal more success. The average speed and frequency of British main-line services have worsened but little since the permanent war timetables were established early in 1940, and this has meant a stabilisation of working which now extends to all but three years of war. In view of the extent to which the trains are now filled with members of the armed forces, as well as with those whose immediate connection with the war effort compels them to travel, this maintenance of speed on British railways is a national service of no mean value, and is something on which the railways will be able to look back with justifiable pride when peace returns.

Railway Engineering and X-Rays

The advent of X-rays and their ability to "see" through many solid bodies provide opportunities for increased efficiency in inspection and repair work. An outline of the nature of X-rays, together with some of the salient features relating to their application, is given in an article at page 348. This brief survey of radiographic methods which are available for examination of metallic bodies is offered to railway engineers, particularly those concerned with maintenance, in the hope that it may be useful to them upon occasions when the method might advantageously be applied in their work. Very often those who are familiar with the use of the X-ray plant have not hitherto had an opportunity of learning where it can best be employed and it is suggested that appropriate proposals which come to the attention of railway engineers should be ventilated to those who can put the ideas to the test. It is in this way that the fullest use can be made of scientific methods. Already the use of X-ray examination of metal structures, and particularly of welding, has been applied fairly extensively, and in previous issues we have referred to its use in a number of instances. The article to which we now direct attention has been written rather with the idea of giving a general idea of the nature of X-ray methods than specific applications.

U.S.A. Flood Control and Railway Relocations

Before the great Mississippi floods of 1927, the United States Federal Government had paid little attention to such matters as flood control. Then, however, Congress authorised the survey of some 200 rivers and streams, and flood control activities were also shared by local authorities. Further widespread floods in the eastern, north-eastern, and central States in 1936, induced a nation-wide demand for adequate action, and the Omnibus Flood Control Act of that year was passed. This Act established a national policy, and it and subsequent legislation ruled that all costs of flood control reservoirs and the consequent relocation of any railways should be borne by the Federal Government. Many dams and embankments to control and impound the waters of various rivers have been projected and several already have been finished. Moreover, in a number of instances railways that followed the rivers concerned have had to be relocated so as to skirt, instead of being submerged beneath, the waters of the reservoirs so formed. These relocations already total at least 350 route-miles of line, and some 24 deviation projects have been sanctioned and financed, and several have been completed; others await approval and allocation of funds. One of those already completed is described and illustrated on page 343 in this issue.

A Projected Canal

Due partly to its geographical features, a canal system never has been developed in England on the scale which has been achieved in some of the flat lands adjoining the west coast of

the Continent. Mr. J. F. Pownall, however, whose project for a new canal system is described on page 356 of this issue, believes that wider use might have been made of waterways in this country by the utilisation of what he terms a "natural canal line," following the 300 ft. contour through the heart of England. Whether his project for a Grand Contour Canal would be justified after the war, bearing in mind not only the cost, but also the fact that canal traffic has decreased considerably during the last 50 years, must remain a matter of opinion; but it is certainly interesting as a piece of civil-engineering investigation. Many of the ideas necessarily are formulated on a broad basis; economic and financial, as well as engineering and geographical, aspects are dealt with, but the author has mentioned little of the expected repercussions on other forms of transport, nor apparently has the question of traffic control been considered.

The Meaning of "in advance of"

An article in an overseas periodical reminds us that here too one sometimes sees the words "in advance of" incorrectly employed. This expression is used, it is true, in British rule books in the opposite sense to that met with on the Continent, where an "advanced signal" is in the position where our distant would be and is encountered first and not last by a driver in passing a station. Popular usage here would fit in with the Continental practice and a non-railwayman would speak of, say, a warning board at the approach to a junction as being "in advance of it," or giving "advance warning" of it. All our rules and regulations, however, are based on the opposite conception and designate something as being "in advance of" a certain point or object if the driver encounters it after passing that spot, not before. Anything met with before is "in rear of" the object. In America "in advance of" bears our railway meaning, but some confusion has been created there by introducing the word "advance" into some signal aspect designations in the opposite sense, a curious oversight.

Pfeil's System of Circuit Diagrams

About 40 years ago the German engineer, Robert Pfeil, who was very closely associated with power signalling development on the Continent, proposed a simplified "straight line" system of making circuit diagrams, to replace—or at least supplement—the large plans covering complete layouts in their ground formation, which it was then the general custom to make. This necessity also made itself felt in America in time, where the so-called "written" circuits were elaborated to meet it. Pfeil's system became universally adopted in Germany and spread to many adjoining countries, where it is still used for signalling work. Pfeil diagrams present a strange appearance to those unfamiliar with them, but enable a large amount of information to be compressed into a very small space, and we hope our short account of Pfeil's circuit "shorthand" on page 346 will enable its principles to be grasped.

Single Driver Tank Engines

Those whose acquaintance with locomotive design is mainly if not, indeed, wholly confined to what may be termed "modern" practice, sometimes appear by the nature of their enquiries to doubt whether at any time tank engines of the single-driver type have figured in the ranks of the locomotives employed for service on British and foreign railways. The answer is, of course, that numerous classes have been built and used for a variety of purposes as determined by traffic considerations, some of them with side, others with saddle tanks, and indeed many with bunker tanks alone. Designs have also been prepared and carried to the construction stage in which the main tanks were in the underslung position, that is, between the frames in the space below the boiler, a feature only practicable in conjunction with outside cylinders and motion. One of the most famous of "single" tank engines in this country was the Aerolite on the former North Eastern Railway, which was renowned for its speed and economy in service; there were numerous others built for working on the larger railway systems and certain of the smaller ones, and the same applied also in earlier periods of railway history to foreign countries as well. Tank engines of what for the times were powerful types had this feature, often with saddle tanks and used for passenger and other classes of service. The type has long since been considered as unsuitable for railway traffic although only a few years back some single-driver tanks were built in Germany for the Latvian Railways and these differed from their predecessors, having modern equipment equalling in many respects that of their larger and more powerful contemporaries.

Towards a Better Understanding

WARTIME conditions on the railways, which necessitate the bringing into the service new entrants in large numbers, introduce a new element into a perennial problem for those who are concerned with staff administration. It must be obvious that at any time the difficulties of maintaining close contact with a staff totalling well over 600,000 is very great; that the railways are alive to difficulties involved was made clear by Sir Thomas Royden, Chairman of the London Midland & Scottish Railway Company, who referred to this matter at the annual general meeting of the company last year. Sir Thomas was speaking of the lowering of moral values which had become evident on the railways since the outbreak of war, and which had been manifest in a substantial increase in the number of railway servants who had been convicted for pilfering. He deplored the fact that some of those who had been guilty of this malpractice had been men who hitherto had untarnished records extending over 30 or 40 years, and he went on to explain that the large number of new entrants into the service provided a very difficult element with which to deal. They had not the high tradition and in many cases not the same high standard as those whose places they had taken. It is not alone in matters of this kind that there is need to inculcate in employees, in large scale undertakings such as the railways, an effective approach and healthy attitude to their work. It is an important managerial responsibility at a time when new men are being taken on at a high rate, although it should not be confined in its incidence to abnormal conditions such as the present. The British railway companies have taken considerable pains to keep in touch, and to maintain good relations, with their employees throughout the system. Some of the steps by which this has been done come readily to mind. House organs of various kinds are used freely by all the lines; suggestions schemes are in operation, open to all grades of workpeople, and there are other means whereby the humblest employee may make contact, either directly or through his union representatives, with the management.

There can be no question that it is highly desirable that employees should understand sufficient of the circumstances of their occupations (such as, at the present time, their importance to the war effort), to induce them to work as effectively as possible. It is equally essential on a long-term basis that there should be placed before employees a sufficient knowledge of the facts of the industry in which they are engaged to enable them to understand wherein their true interest lies. It is not too much to say that whether or not this work is done well may influence the economic and political future, not only in the industry, but of the country. In the present war, for instance, it can be said that the policy of the unions in general has not been calculated to ensure a continuance of efficient large-scale private enterprise. It must be obvious that large scale enterprise cannot continue to exist in private ownership if it is forced to pay wages so high, or to submit to working conditions so onerous, that its resulting prices drive customers away, and so in fact destroy the jobs on which the employees are dependent for their livelihood. It is equally true that large-scale industry cannot be taken from private owners and operated successfully by the State unless the State deprives the employees of the power to enforce the practices which caused the undertakings to fail in private hands. Either employees must know how to co-operate and act on their knowledge to permit large-scale private industry to function efficiently, or one of two things becomes inevitable; large-scale industry will cease to exist or it will fail in private hands and will be taken over by the State which will be forced to use coercion to make it continue functioning.

These matters have been the subject of a good deal of thought in the United States in recent months, and a book entitled "Sharing Information with Employees," written by Mr. Alexander R. Heron, has recently been published by the Stanford University Press, California. Our American contemporary, the *Railway Age*, has given an extensive review of this work and points out that the author is manager of the Crown Zellerbach Corporation and a consulting professor at Stanford University. Mr. Heron, in arriving at the principles which govern the imparting of information to employees, goes back to the small factory of 75 years ago, when capital and labour were well aware they were partners and mutually dependent. He suggests that by keeping this small factory in mind, and what its employees knew about it, which knowledge made them willing co-operators, it is possible to arrive at the type of information which large-scale industry must strive to impart. In the small factory, which might employ eight men, of whom one would be the owner, the seven who received wages would be well aware by constant association with the other of the work he did, of the efforts he put forward to secure business, to maintain goodwill, and to meet his obligations, including the remuneration of his men. In that case, the employees' attachment to the employer is basically

practical, they recognise in him the salesman who gets the orders and brings work to them; that he collects the money which pays their wages; that he manages to procure and equip the factory to any extent which may be necessary; and they are realistic enough to know that they can and do get their full share of the income of the business.

Mr. Heron's view is that the employee ought to have a number of classes of information, such as that relating to the finances of the company; profits; the significance of each class of work in the total product; the source of raw materials and nature of the market for the production; and so forth. It is not without interest to note that Sir Ronald Matthews, who besides being Chairman of the London & North Eastern Railway Company, is also Chairman of the Brush Electrical Engineering Co. Ltd., has made a practice after the meeting of the latter company, to address a meeting of the employees and to explain the finances of the company to it. His view is that it is important and that it will become increasingly so, that everyone concerned in the business of the company should have a clear picture of what was going on and why it was going on. The progressive attitude adopted by Sir Ronald Matthews is one that might well be followed by other large-scale industrialists.

Rail Defects

AN aspect of track maintenance which by degrees is coming into greater prominence is the soundness of the steel rail. With all allowance for the improvements in steelmaking which have taken place during the last two decades, this subject is one that deserves closer attention. Rails that develop defects in service not merely represent a loss because of curtailed life and the cost of their replacement; they can be dangerous. North American railways have reason to understand the potential risk as they review the many disastrous derailments that have resulted from fissure failures of rails; and as to cost, the fact that in the United States, in the nine years from 1932 to 1940, the removal of rails from the track has grown by degrees from 7,141 to 19,785 annually, is a sufficient indication of the aggregate loss that can be caused by one class of defect alone. It is, of course, a matter for congratulation that out of these totals the proportion of dangerous fissures detected by the Sperry cars before actual failure occurs has risen, in this 9-year period, from 35 to 76 per cent., and at the same time the proportion that has broken in service has dropped from 65 to 24 per cent.; but even so the loss represented by these defects is very great, and to it the cost of maintaining the detection service must now be added. It is also satisfactory that the controlled cooling of rails has definitely mastered the tendency to fissure. The first controlled cooling was introduced at one Canadian mill in 1931, a year out of the production of which 5,379 rails had failed by reason of transverse fissures; by 1936 all United States and Canadian mills were equipped to apply controlled cooling, and of 1937 rails only 60 have failed by fissuring, and there have as yet been no failures from 1939 and 1940 rails. The first mill to introduce the process has had no fractures from this cause of any of its rails rolled from 1932 to 1940 inclusive; the last mill to come into line has against it the damaging total of 3,191 broken rails, by transverse fissures, from its production between 1931 and 1936 inclusive, but only 50 from its 1937 rails, 3 from those rolled in 1938, and none from those produced in 1939 and 1940. Nevertheless, many years must elapse before the transverse fissure trouble can be considered as at an end in North America; the peak of yearly failures, from the pre-controlled cooling years, has not even yet been reached.

Although we have not suffered in Great Britain from transverse fissure failures in rails—chiefly due to greater moderation than in America in our chemical composition—it must not be thought that we have a completely clean bill of health in the matter of rail soundness. Neither must the relatively small number of failed rails, which British railways are under statutory compulsion to report to the Ministry of Transport, be considered as the full measure of defective rail loss in this country. It is true that for many years no derailment involving fatal casualties has taken place in this country that could be attributed to a broken rail, but the loss resulting from defective rails is not confined to those which have actually broken. The "reportable" rails just mentioned are those which have broken completely through in service, and even then are only rails which were of "full section" before breakage; that is to say, rails which have been reduced in section by planing to be made up into switches and crossings are expressly excluded. If all broken and defective switch and crossing rails be taken into account, and also the many rails which have begun to develop defects in service, but have been removed from the track before failure actually occurs, the defective rail problem in Great Britain is seen in its proper perspective, and is found to be of by no means negligible proportions. It is the practice in the United States, in analysing rail failure statistics, to proportion the number of failures to the tonnage supplied by each rolling mill in any given year, and the publication of these figures doubtless has a salutary effect in forcibly encouraging the black sheep among the makers to mend their ways. For there are black sheep; a standard specification does not necessarily ensure a uniformly high standard of quality in the product to which it refers. But in justice to the manufacturers, it is necessary to add that not all the conditions conducive to failure lie within the rail.

It is increasingly realised, for example, that slipping locomotive driving wheels or wheels that skid due to careless braking can so damage the head of a rail as to compel its replacement, either by grinding a depression in it or by causing incipient cracks which later develop and cause failure. Faulty locomotive balancing, resulting in excessive hammer-blow, or bad flats on wheels, can also impose such stresses on rails as to fracture them. Other fracture-producing tendencies may lie at the door of the user. The rail as received from the manufacturer represents the fruit of carefully controlled and systematised thermal processes from the melting-shop to the finished article, the physical properties of which are adequately covered by the prescribed tests. Are the various heat-treatments that the user may apply to the rails under equally accurate control? They include, for example, the quench-hardening or flame-hardening of rail-ends to which reference has already been made; the hardening of noses and wing-rails of crossings; the building up of crossings by welding; the continuous welding of rails; and so on. Not a few rails which have been subjected to such treatments have later failed in service; would the heat-treated portions of such rails have withstood without fracture the falling weight test which represented the minimum standard of safety when the same rails were rolled? The transverse fissure defect appears to be a responsibility shared equally by the manufacturer and the user in North America, seeing that the railways countenanced the high carbon limits in American rail specifications which have been the chief cause of the trouble. Manufacturers alone are responsible for such causes of rail failure as piping, segregation, inclusions of slag or other foreign matter which come under the general head of "dirty steel," laps, seams, and various other undesirable results of careless manufacture. The Sperry detector cars in America, in addition to their normal function of discovering transverse fissures, have done good service by drawing pointed attention to such manufacturing delinquencies, many of which are faithfully recorded. Thus manufacturing, maintenance, and rolling stock may all play a part in shortening what should be the proper life of the rail, and in view of the magnitude of the problem, the matter is deserving of more serious analytical study than it has yet received in this country.

Publications Received

Essays in Transportation: In Honor of W. T. Jackman. Edited by H. A. Innis. Toronto: Canada. The University of Toronto Press. 9 in. × 6 in. 165 pp. Price 11s. 6d. net.—This is a collection of essays issued in honour of Prof. W. T. Jackman, who is to retire this year from his position as Professor of Transportation at the University of Toronto after 25 years of service in that institution. Among them are "Some Comparisons in Canadian and American Railway Finance," by H. E. Dougall, Professor of Transport & Corporate Finance at Northwestern University, who discusses the question of government and private financing in the two countries, pointing out that "in Canada the taxpayer shares with the investor the effects of shrunken railway earnings, while in the United States the private investor bears the brunt of railroad losses." The author is greatly concerned with the "dead capital" in the Canadian National which the government must continue to support and is in favour of a unified management of the two Canadian systems. Mr. F. L. Barton, chief of the Economic Section, Tennessee Valley Authority, in "Principal International and Interterritorial Class-Rate Structures of North America" presents a discussion of alleged rate discrimination. Dr. G. Lloyd Wilson, head of the Division of Rates, Office of Defense Transportation, and Professor of Transport at the University of Pennsylvania, in "Some Basic Problems in the Public Regulation of Transportation" praises the need of scholarship of the type represented by Prof. Jackman in solving the present problems of transport regulations. Mr. W. M. Drummond, of the Ontario Agricultural College, in "Transportation and Canadian Agriculture" points out the peculiar needs of the Canadian farmer for the cheapest possible transport. Mr. W. G. Scott, of the London School of Economics, in "An Aspect of the British Railways Act, 1921," reviews financial relationships between the British Government and the standard trunk-line railways since 1914, with special reference to the recent war-time agreements and revenue guarantees. The author concludes that the railway stockholders have received generous treatment since 1940.

The Scrap Heap

It was stated in a police prosecution recently that in the past year more than 66,000 knives, forks, and spoons have disappeared from canteens run by the L.P.T.B., and that replacements have cost £8,000.

* * *

Through the Red Cross Penny-a-Week Fund approximately 300,000 miners have contributed £120,000 for Red Cross work, and 350,000 railway workers have raised £145,000. Of the railway workers, L.M.S.R. employees lead with £60,000; L.N.E.R. workers have contributed £52,000, G.W.R £18,000, and Southern Railway £17,000.

* * *

A summary of five years' experience with metallic ties on the Belgian State railroads is given by Mr. Janssen . . . Up to the time of making the report the track with metallic ties has cost for maintenance about nineteen times as much as the track with creosoted oak ties. Beyond this, many of the metallic ties are damaged to such an extent that they must soon be removed.—*From the "Scientific American," August,* 1892.

* * *

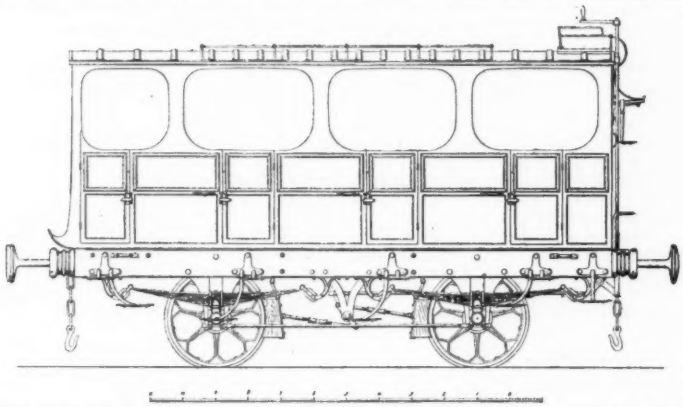
Guilty Men

The train from the coast was well filled, and passengers were standing in the corridors when it halted at the country junction. Here were many more passengers returning from the Lake District. They squeezed into the coaches. In ordinary times there would have been many acid comments on the inadequacy of the railway services, and passengers already in possession of seats would have been scowled on and made to feel that they were taking up an inordinate amount of space. But on this occasion the travellers came in meekly, set their suitcases in the corridors, and sat upon them without any preliminary scowling search for seats. "Of course, we were told not to travel," they said to one another, and grinned a little sheepishly. "That's right," they said. "We've been told all about it." They had the air of children caught dawdling in the streets after the school bell had gone. When the guard came down the train they stood up to let him go by as if he were a very great personage indeed. Oh, yes, they were awfully decent to the guard.—*From "The Yorkshire Post."*

* * *

A Railway Coach of 1847

By the courtesy of Mr. O. V. Bulleid, Chief Mechanical Engineer, Southern Railway, we are enabled to reproduce herewith



a drawing of a second class passenger coach built at New Cross in 1847. The drawing bears the signature of Mr. H. Bridges of the Carriage Department, New Cross, who is described in the London & Brighton secretarial records as Carriage Superintendent in the employ of the South Eastern Company, and there is a record in the minutes to the effect that he was paid £150 for the services he rendered to the Croydon Company, which subsequently formed part of the London, Brighton & South Coast Railway system, which came into being in 1846.

It would appear to have been one of a batch of ten second class coaches constructed to form a nucleus stock for the L.B. & S.C.R. No details are available concerning the design and construction of the underframe, etc., but it can be assumed that the body was unglazed as the only coaches which had windows in those days were the first class ones. Attention may be drawn to the method of building up the wheel centres from what was presumably bar wrought iron, and the brake rigging is also worthy of attention; the wooden brake blocks were applied by a system of rodding with an arrangement for taking up the wear by screwed thimble fastenings. We have not been able to ascertain the tare weight of the coach, nor is its seating capacity known.

* * *

A New Excuse

A boy of about 16 was charged in the juvenile court at Guildhall recently with travelling on the L.N.E.R. without paying his fare. Officials of the railway said there was a mystery about him. He was recently found in a train, between Cromer and London, and when asked for his ticket he said he had not one, adding that he was a German parachutist, and had been dropped with 10 others in "open country," but he did not state where. He was remanded for inquiries.—*From "The Evening News."*

* * *

Wartime Innovation!

Due to the shortage of fuel, fires will be lighted in railway waiting rooms only during wintry weather.

* * *

According to the *Street Railway Review* of September, 1892, there were then nearly 1,000 tramway companies in the U.S.A., of which more than 400 were electrically-operated, in whole or in part.

* * *

Who was the Big Buyer?

A suggestion that Goering was the purchaser [of home railway stocks]—in order to provide for the post-war upkeep of his newly acquired refuge villa in Sweden—was not taken seriously.—*From "The Diarist" in "The Financial Times."*

* * *

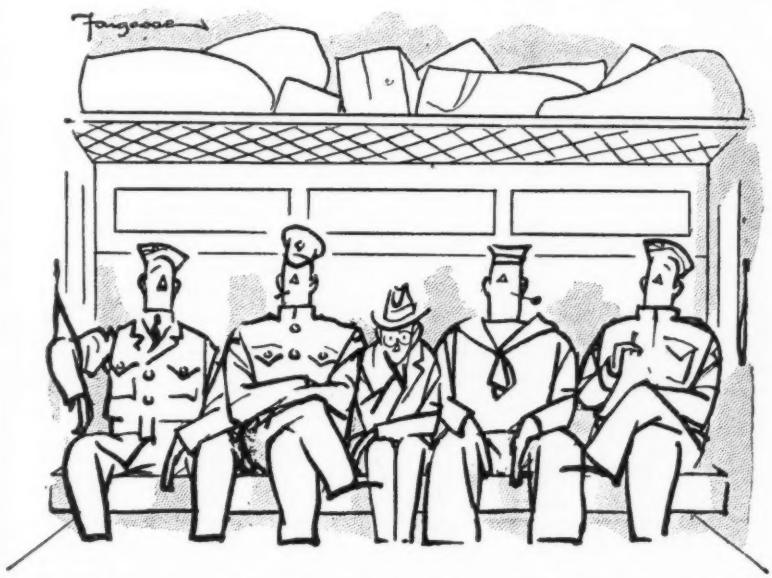
Tailpiece

Day return tickets were withdrawn on October 5.

Corinna's going to town, but why
The hesitation in her eye?
Are stocks depleted, bargains rare?
Is it the weather, or the fare?

Corinna's going to town, but fears
The unrelenting voice she hears:
"Corinna, if you must, you may,
But day returns are off today."

E. C.



"Now, if I don't show any interest they'll think I'm standoffish, and if I do they'll look on me with grave suspicion for the rest of the journey"

[*Reproduced by permission of the proprietors of "Punch"*]

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

WESTERN AUSTRALIA

Midland Junction Workshops Canteen

Some time ago, after representations by the staff (totalling over 2,000) at the Midland Junction Railway Workshops, a new building was provided for use as a canteen. The latter formally was handed over to the employees and now is being operated by a welfare committee of the men themselves. Stocks and equipment are owned by the committee and the Western Australian Government Railways contribute towards the wages of the attendants. The canteen caters for the requirements of the men for light refreshments, tobacco, cigarettes, and so on, and is open at meal times, as well as for a short period before starting time in the morning. The canteen now has been added to by the construction of a luncheon room in which seating accommodation is provided for 200 men. Previously the men took their meals close to their work and, although a large number continue to do this, the luncheon room provides a facility for those who desire to eat away from the immediate vicinity of their particular job; it is being used widely.

Ambulance Train

In common with other Australian railway systems, an ambulance train has been assembled for the conveyance of sick and wounded over the Western Australian Government Railways. The train consists of a staff coach, personnel coach, administration coach, kitchen and dining car, and ward coaches. Patients are accommodated in the usual hospital-type bunks. Each coach has an adequate water supply, and provision is made for emergency lighting, and for blackout facilities. The exterior of each coach has been painted white, with a large red cross on both sides and on the roof. The coaches have been withdrawn from traffic and converted for the particular use required.

SOUTH AFRICA

Mechanical Workshops

The capital and improvement estimates of the South African Railways & Harbours for 1940-41 authorised expenditure amounting to £765,783 for the purpose of providing additional accommodation and improvements at mechanical workshops, and also the sum of £922,135 for the purchase of new machinery and equipment. The total expenditure contemplated under these heads represented an increase of £158,998 over the figure for the preceding financial period. During the year 1940-41, works authorised included the provision of new workshops at the Durban graving dock, new erecting and machine shops at East London, and the renewal of the water pipeline in the workshops area at Salt River. An amount of £100,000 also was authorised for the purchase of new machinery and equipment for the mechanical workshops at Salt River, East London, Uitenhage, Bloemfontein, Durban, Pietermaritzburg, and Pretoria. The period showed unprecedented activity in all departmental mechanical workshops, in which, in addition to a great deal of manufacturing work, every effort was made to maintain steadily normal repairs and maintenance. Much of the work carried out for the Director-General of War Supplies and the Defence Department called for a considerably higher degree of accuracy than usually is required in railway workshops. After laboratory experiments conducted during 1939-40 with regard to the separation of the components of mixed metal turnings, a Bellman metal-separating plant was installed in the Pretoria workshops.

UNITED STATES

Further Pennsylvania Improvements

A very important improvement to the St. Louis Division, estimated to cost a total of $3,000,000, has been put in hand by the Pennsylvania Railroad, in addition to other costly schemes, such as the Baltimore freight concentration yards, work on which already is proceeding. The westernmost section of the P.RR., from Indianapolis to St. Louis, used by such important passenger trains as the Spirit of St. Louis, and by increasingly heavy freight traffic, is 240 miles in length and largely single track. An additional length of 17 miles, from Smithboro to Pierron (36½ miles from St. Louis), is to be double-tracked, and nine passing loops (two at Marion, and one each at St. Elmo, Hunter, Smithboro, Highland, St. Jacob, Aden, and Casey) are to be extended sufficiently to accommodate 150 cars each. The double track between Limedale and Almeda is to be equipped with reverse signalling, so that both lines may be used, when necessary, for simultaneous working in one direction. New interlocking towers (signal boxes) are to be provided at Vandalia and Smithboro; the latter station will have a c.t.c. machine to control the Pennsylvania-Burlington crossing at this point; and the functions of the interlocking plant and c.t.c. machine at Vandalia, which controls the Pennsylvania-Illinois Central level crossing there, are to be extended. Another Pennsylvania improvement, now nearing completion, is that to the Bay Junction yard at Sandusky, Ohio, 29 miles west of Crestline on the main line from New York and Pittsburgh to Chicago. By additional trackage the capacity of the yard has been increased from 7,800 to 8,600 freight cars, which will facilitate greatly the despatch of empty cars after their arrival with coal from the Pennsylvania Company's three coal-loading plants at Lake Erie ports. The total cost of the Sandusky scheme is put at $242,000.

The Missouri Pacific and New Orleans

July 5 was an important date in the history of the Missouri Pacific Railroad's services into and out of New Orleans. On that day, for the first time, M.P. trains passed over the 5½-mile Huey Long bridge across the Mississippi River, proceeding by way of the Public Belt Railroad tracks past Audubon Park and the steamship wharves to Thalia Street Passenger Station, so leaving the previous west-bank route *via* Avondale and Gouldsboro. Although the new route is 6½ miles longer than the old, it avoids the troublesome business of ferrying the trains across the Mississippi from Gouldsboro, which involved breaking them up into sections for accommodation on the ferry, and made additional ferry trips necessary if the trains exceeded 8 coaches. Trains on the new route may be of any length; on nearing the terminal they are worked round a "wye" and backed directly into the station; no reduction in schedule times is being made at present, but it is anticipated that ultimately the Huey Long bridge route will mean a saving of at least 15 min. on each trip. Freight-train operation by the same route began on August 1, and the car ferries then were abandoned. Ancillary works have included the construction at Avondale of a new passenger station, and the laying-out there of a classification and interchange yard accommodating 500 freight wagons. New engine-shed facilities have been provided at Avondale, and also near Thalia Street Station, with all modern servicing facilities; another new development is the laying-in of interchange tracks with the Illinois Central at Shrewsbury, near East Bridge Junction. For the sake of economy, much of the material used has been salvaged from that no longer required at the old Gouldsboro ferry terminal, and its transfer to Avondale and Thalia Street has provided one of the biggest transport problems in New Orleans for some years past. Other M.P. developments now in progress include the enlargement of North Little Rock freight yard by new tracks to hold 424 additional wagons, and of Texarcana yard to hold 190 more wagons.

Selling Lounge Space in Trains

The Pennsylvania Railroad has followed the lead of the New York, New Haven & Hartford Railroad in selling by reservation all seats in observation and lounge cars, except in the café sections of these vehicles, which still will be used for the service of light refreshments. Hitherto lounge accommodation has been regarded as additional to train seating, and has been at the disposal of passengers with booked seats in other parts of the trains concerned, but the demand for accommodation is now so great that the practice cannot be continued. In the long-distance coach trains, such as the Trail Blazer (New York-Chicago), Jeffersonian (New York-St. Louis), East Wind (Washington-Maine Coast resorts), and South Wind (Chicago-Miami), the new arrangement will provide about 50 additional seats to each train; every Pullman-sleeper-observation car will provide some 25 additional seats, and 12 will be available in each Pullman-parlour-lounge. The lounge and observation car seats will be allocated as far as possible to passengers making the shorter journeys, who are to be congratulated on their good fortune in securing thus some of the most palatial accommodation in the trains.

ITALY

Trans-Apennine Ropeway Project

The idea of connecting Genoa with the Plain of Lombardy by a ropeway has been cherished in Italy for many years. According to a recent report of the Genoa Port Administration, work on the first section already has been commenced. It is being built by, and will be operated by, the Italian State Railways; it is to connect the port of Genoa (Rubattino basin) with Arquata Scrivia, a distance by rail of only 43 km. (27 miles) from Genoa (Porta Principe); the length of the ropeway, however, will be 35 km. (21 miles). The difference in level to be overcome is from practically sea level to 790 ft. at Arquata Scrivia. The highest point on the main railway line between Genoa and Arquata Scrivia is at Busalla (1,180 ft.), and the ropeway too will have to reach a higher level before descending to Arquata Scrivia. It will carry goods traffic only.

A New Railway Link with Genoa

A scheme also is proposed for connecting Genoa, by a direct trans-Apennine railway, with Borgotaro, on the La Spezia-Parma line, thus creating a direct connection between Genoa and the Brenner line as well as with North-Eastern Italy in general.

Special Measures to Consolidate New Earthwork

Methods employed with sandy soil on a Santa Fe main-line deviation

A 20-MILE deviation of the Atchison, Topeka & Santa Fe Railway main line has been completed recently by U.S. Army Engineers on behalf of the Federal Government in order to skirt the new John Martin reservoir formed by damming the Arkansas river in Bent County, Colorado. Though this work bears a certain resemblance to the relocation of the Southern Pacific main line to avoid the Shasta dam reservoir—described and illustrated in our issue of February 6 last—both in general layout and to some extent in the consolidation methods employed, the dune sand and loess and also the moving sandhills on the Santa Fe deviation required even more drastic measures to secure stabilisation of the formation and protection from drifting sand. This deviation, moreover, has been completed.

The John Martin reservoir has been formed by damming the Arkansas river near Caddoa, and is approximately 14 miles long and 2 miles wide. The Santa Fe line formerly followed the south bank of the river throughout this 14-mile length, and has had to be shifted about 1½ miles farther south so as to skirt the reservoir. In order to rise above the water level of the latter, it was necessary for the new line to leave the old some eight miles downstream from the dam and climb gradually along the higher ground forming the southern slopes of the valley. The ruling gradient on the realignment is 1 in 250 and the sharpest curve 1 deg. (5,730 ft. or about 87 ch. radius). The permanent way consists of 131-lb. rails on treated 7-in. × 9-in. × 9-ft. sleepers with 10 in. of slag top ballast over 7 in. gravel sub-ballast.

Details of Country Traversed

The country traversed is semi-arid and the soil mostly heavy dune sand, though there is some clay, soft shale, and rock. It is also dotted with "migrating sand dunes," and one deep bed of loess was encountered. Except at the crossings of the Mud, Caddoa, and Rule creeks—tributaries of the Arkansas river—formation is not heavy and embankments seldom exceed 25 ft. in height. The approach embankments to the bridges over the Caddoa and Rule are both up to about 80 ft., and at Caddoa creek over 1,300,000 cu. yd. of fill were involved. The deepest cutting is 25 ft. in sandstone and shale. As the soil required for banks greatly exceeded excavation from cuttings, some 2,291,000 cu. yd.—out of a total of 3,150,000 cu. yd. of earthwork—or over 72 per cent. came from borrow pits. The standards laid down were: for banks less than 20 ft. high, formation width 20 ft. and 2 per cent. of the height of bank on the centre line; for 20- to 40-ft. banks, 22-ft. formation and again 2 per cent. height; for over 40 ft., 24 ft. formation. Formation width in cuttings is 28 ft. and upwards, and side slopes of banks not submerged or liable to wave action are 1½ to 1; side slopes in cutting vary from 4 to 1 in sand to 1 to 1 in shale or rock, and even ½ to 1 in solid rock.

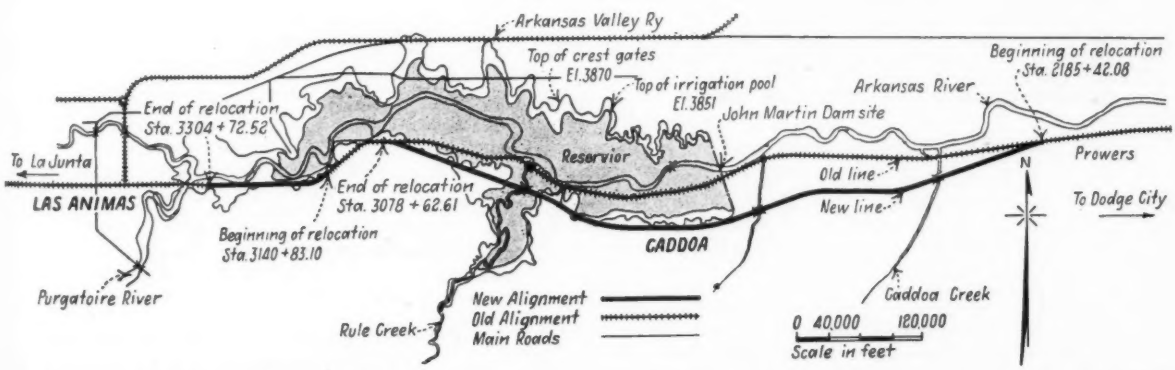
Special Earthwork Measures

The following are some of the more unusual methods of construction employed in accordance with specifications. The whole of the area covered by the foot of each embankment had to be ploughed, scarrified, or otherwise broken up to a depth of 9 in., and then consolidated by wetting and rolling with a sheepsfoot roller. The foundation area was so consolidated that the material, to a depth of 9 in. had a density at least equal to the density required for that particular soil when placed in embankments. This was done immediately before placing the embankment material on the foundation. Normally, dune sand containing a small amount of binding materials was deposited in the embankment in 8-in. layers alternately with similar layers of other materials containing clay, silt, or other adequate binding material; the layers were spread to the full width of the embankment and built to correct slope. In no circumstances was an embankment allowed to be widened by side dumping, and it had to be kept crowned throughout construction; no water was allowed to collect and stand on it. Each layer was watered and rolled to provide complete consolidation to full width, and was also carefully graded before the succeeding layer was placed.

If sprinkling of layers was not considered uniform or adequate, the contractor was required to wet the material in the borrow pits before excavation. On the other hand, material containing an excess of moisture had to be allowed to dry before consolidation. When water had to be added to the material it was mixed thoroughly and uniformly with the soil by means of spring-tooth harrows, disc harrows, or disc ploughs. The quantity of water required to give correct consolidation was determined by the engineer in charge. Usually, the sheepsfoot roller had to pass over every spot eight times to secure correct consolidation.

In banks composed partly of earth and partly of rock, the latter had to be deposited in layers not exceeding 2 ft. in thickness, to the full width of the embankment, and all voids were completely filled with earth, moistened as required. Consolidation was effected by rolling with the contractor's hauling and spreading equipment, if necessary by making additional passes over each layer to insure thorough consolidation. The succeeding layer over the rock was of earth not exceeding 8 in. thick before consolidation, which was placed and consolidated as previously described.

The embankment was completed to its final dimensions and gradient and its surface smoothed out so that there were no ruts or hollows, and it was then covered with a layer of bank-run gravel 7 in. deep after consolidation, which work was carried out with moistening, when necessary, as in the case of an earth layer. The haulage of the gravel was not allowed over the earth embankment, but was carried out

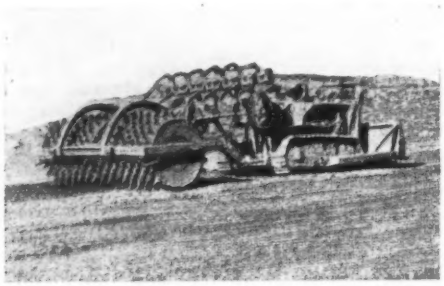


Sketch map of the area involved in the John Martin Reservoir project in Colorado, showing the 20-mile diversion necessary on the Atchison, Topeka & Santa Fe Railway

over the sections already surfaced with gravel. In cuttings, excavation was carried 7 in. below formation level to allow for the 7 in. of gravel, which was consolidated as above.

Treatment of Loess Loam Bank Foundations Subject to Submersion

The area of loess—an unstratified deposit of yellowish-brown loam—in Rule creek valley, was within the reservoir area, and, therefore, required even more stringent specifications. The loess extends to a depth of 10-15 ft. down to rock, and, as previous experience showed, it was liable to as much as 18-in. sinkage when wetted with reservoir water. The whole foundation of the embankment on this soil was, therefore,enclosed with temporary earth dykes and completely covered with water. After the water had soaked into the foundation, the latter was again flooded, and the process repeated until the foundation was completely saturated to the approval of the engineer, but not for a period longer than 30 days before a beginning was made with the construction of the embankment. Immediately before work began on the first layer, the water was drained off, and, after drying sufficiently to be worked, the foundation was consolidated as in other cases with a sheepsfoot roller. With an average of 14 passes over each layer, the sheepsfoot roller also consolidated the submerged portion of the embankment across Rule Creek valley; the remainder was treated as for other embankments. That maximum density in this high bank was thus secured was proved by level readings—taken through the completed bank—on steel plates placed on the foundation surface; settlement was just about 18 in. as estimated.



One of the sheepsfoot rollers used for consolidation

Erecting the 326-ft. 3-span bridge over Rule Creek

Mechanical Equipment used

Two fleets of mechanical equipment were used on this construction (1) a " scraper outfit " for banks up to 25 ft. high and earth leads up to 1,000 ft., and (2) a " wheeler outfit " for higher banks and longer leads. The scraper outfit included 12 tractors, some equipped with bulldozers, 7 7-yd. trucks, 10 13-yd. scrapers, 2 sheepsfoot rollers (14 ft. wide, 5 ft. in dia., and weighing 7½ tons), and 1 blading grader. The wheeler outfit had 12 7-yd. wheelers, 5 hauling tractors with bulldozers, 2 blading graders, and 2 sheepsfoot rollers. Water carts and tankers were also used. Three shifts were worked with the aid of floodlighting, and on an average 25,000 cu. yd. of material were moved each working 24-hr. period, though a 35,000 cu. yd. figure was attained on several occasions. Due to the danger of freezing with such moist banks, this work was suspended during the winter months.

One of the ponding areas used to wet the material before placing it in an embankment

Hand-packed stone pitching or rip rap was used to protect the slopes of all submerged banks and was laid 2 ft. thick. To improve the flow in the Caddoa Creek channel, it was straightened out and paved with a 12-in. lining of concrete, keyed into the bedrock with drop walls up- and downstream of the bridge.

Three Major Bridges

The bridges over the three creeks consist of deck plate girder spans, with ballasted decks, designed for Cooper's E-65 loading. The piers and pier-abutments are of reinforced concrete; foundations were carried down to a maximum depth of 30 ft. to reach sandstone; the piers at Caddoa and Rule creeks are from 85 ft. to 100 ft. high. The Rule creek bridge consists of two 115-ft. continuous spans and one 90-ft. simple span. Mud creek bridge has one 80-ft. flanked by two 60-ft. simple spans, and Caddoa creek bridge has three continuous 100-ft. spans. Foundation work was carried on in winter by heating the aggregate and water and covering with tarpaulins. Girder erection was not carried out until the steelwork could be brought up by rail. The Rule and Caddoa creek continuous spans were launched with the aid of a field splice, a single falsework bent, and a locomotive crane.

Means Taken to Anchor Migrating Sand Dunes

The moving sand dunes were controlled by planting saplings and by seeding native grasses, the ground being mulched with wheat and barley straw in the latter case. The straw was evenly spread, 6¾ tons to the acre, and then rolled with

a land packer having 18 disc-type wheels spaced 9 in. apart, which tucked the straw into the soil to a depth of 2 in. and anchored it and the sand below it against movement by the wind, and so enabled the grass to take root. In all, some 500 acres of dune sand were so treated; 27 acres were covered with cottonwood and tamarisk saplings in alternate rows 10 ft. 6 in. apart and spaced at 4 ft. intervals in each row.

The whole work was carried out at the cost of the Federal Government under the U.S. Army Corps of Engineers. Formation and bridge masonry work were contracted for by the Western Contracting Company of Sioux City, and the steelwork was fabricated by the American Bridge Company, Pittsburg, and erected by List & Weatherly, Kansas City; platelaying was done by the railway. Mr. G. W. Harris, Chief Engineer, and Mr. T. A. Blair, Chief Engineer, Western Lines, supervised the work as a whole on behalf of the Santa Fe Railway Company, acording to our American contemporary the *Railway Age*, to whom we are also indebted for the illustrations.

L.N.E.R. Locomotive Conversion

Some additional particulars

ON pages 10 and 11 of THE RAILWAY GAZETTE, July 3, 1942, there appeared a short article dealing with the conversion on the L.N.E.R. of some of the class Q4 eight-coupled freight engines, originally built by the former Great Central Railway, into shunting tank engines with the same wheel arrangement and re-classified Q1. As then stated, the tenders made available by the conversion are being allocated to some new 2-8-0 coal traffic locomotives now under construction at the company's works. By the courtesy of the L.N.E.R., we are now enabled to supplement the information given earlier by diagram drawings and by the following tables giving the leading dimensions and ratios of the locomotives before and after conversion :—

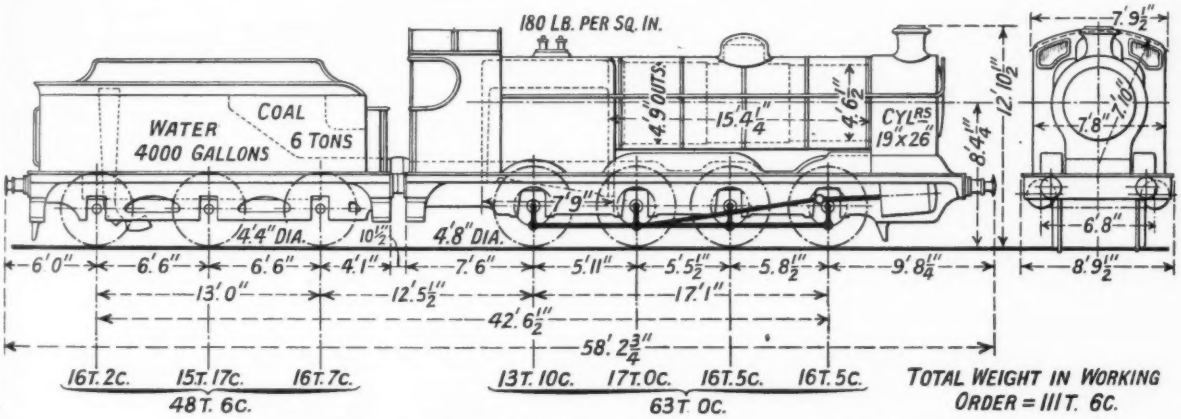
Q4 CLASS

Cylinders, dia. and stroke	19 in. × 26 in.
Wheels, dia.	4 ft. 8 in.
Wheelbase—engine	17 ft. 1 in.
engine and tender ...	42 ft. 6½ in.
Boiler—max. dia. of barrel	4 ft. 9 in.
overall length of firebox ...	7 ft. 9 in.
length between tubeplates ...	15 ft. 4¼ in.
Tubes—small, no.	94
dia., outside	2 in.
Heating surface—firebox	140 sq. ft.
tubes	756 ,,
flues	442 ,,
Total (evaporative) heating surface	1,338 ,,
Superheater heating surface	230 ,,
Combined heating surface ...	1,568 ,,
Working pressure	180 lb. per sq. in.
Grate area	23·62 sq. ft.
Weight of engine in working order ...	63 tons 0 cwt.
Tractive effort at 85 per cent. b.p. ...	25,644 lb.
Adhesive weight ÷ tractive effort ...	5.5

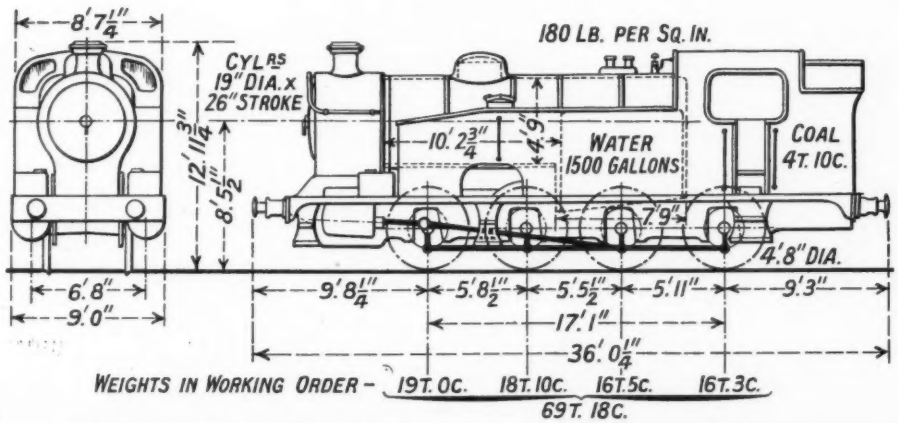
Q1 CLASS

Cylinders, dia. and stroke	19 in. × 26 in.
Wheels, dia.	4 ft. 8 in.
Wheelbase	17 ft. 1 in.
Boiler—max. dia. of barrel	4 ft. 9 in.
overall length of firebox ...	7 ft. 9 in.
length between tubeplates ...	10 ft. 2⅝ in.
Tubes—small, no.	228
dia., outside	1¾ in.
Heating surface—firebox	141 sq. ft.
tubes ...	1,068 ,,
total ...	1,209 ,,
Working pressure	180 lb. per sq. in.
Grate area	23·62 sq. ft.
Weight of engine in working order ...	69 tons 18 cwt.
Tractive effort at 85 per cent. b.p.	25,644 lb.
Coal capacity	4 tons 10 cwt.
Water capacity	1,500 gal.

In commenting upon the conversion of these locomotives in the previous issue referred to, we remarked that as eight-coupled tank engines, they should prove extremely serviceable for the heaviest shunting operations. This is more particularly so because in the absence of any additional carrying wheels, the whole weight of the engine is available for adhesion.



Principal dimensions and weight distribution figures of engine as originally constructed



Dimensions and weight allocations after conversion from tender to tank locomotive

Central European System of Circuit Symbols

A simplified system introduced by the German engineer, Robert Pfeil, about 40 years ago, and since generally adopted in Central European countries

IN the early years of power signalling it was the practice to draw elaborate circuit diagrams, in which the whole of the apparatus was shown in its relative positions, with the complete wiring between all the items in an installation. Although diagrams so arranged are useful for certain purposes, they are often crowded with so much detail that rapid consultation is difficult, whilst their unwieldiness is an obstacle to their use out on the line. These considerations led to the development of what came to be called "written" circuits, in reality a form of circuit shorthand, the principle of which is to show each circuit by itself, reducing it to a line of symbols from which its composition and function can be very quickly understood. The various components are of course shown in their electrical, and only by inference therefrom in their geographical, relationships. A long circuit can thus be represented on a relatively small sheet, a handy set of sheets taking the place of the large and awkward plans formerly thought necessary.

The written circuit principle was carefully worked out for signalling purposes in America and found favour in Great Britain, where it has been much used. There are some, however, who feel it undesirable to carry such a refinement too far in the case of diagrams intended primarily for the maintenance men and who prefer, so to speak, not to make the shorthand too short. On the Continent another system arose, initiated by the late Robert Pfeil (1864-1928), of the well-known firm of Siemens & Halske, one of whose first sketches outlining the scheme, made in 1900, we are able to reproduce (Fig. 1). His methods secured general adoption in many countries for railway signal work—at times for other work also—and are often seen in patent specifications submitted by foreigners in this country. Some explanation of their principles may therefore be both interesting and useful to readers.

Pfeil's System of Circuit Symbols

The one really distinctive characteristic of Pfeil's system is the symbol chosen to designate contacts, the three chief forms of which are shown in Fig. 2. All that has to be remembered is that the current *cannot pass where an arc strikes across a line.* (A single exception to this convention is referred to below.) It does not matter at what angle conductors are drawn at the junction point, this symbol can always be used. Occasionally a special form of contact is designated by providing double arcs, adding an arrow point to the end of an arc, or effecting some other small distinction. The means by which a contact is operated are indicated by a sign placed beside it, with the support of lettering, numbering, etc., as may be necessary for complete identification. This is seen on the right of Fig. 2 and the signs may be understood by consulting Figs. 4 and 5 also. (The signs given have been arranged to show the principles involved and are not necessarily those used in any particular country.)

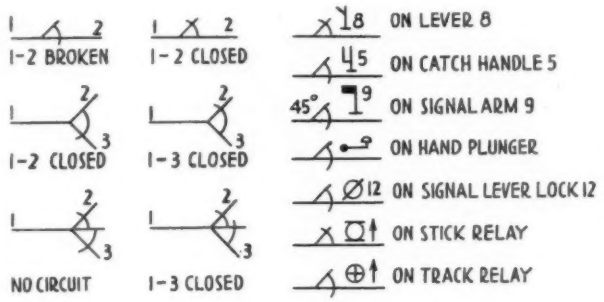


Fig. 2—Representation of contacts

In the great majority of cases in signalling, the actual apparatus included in a circuit is composed of relays and electromagnets of various kinds and a typical range of symbols covering these is given in Fig. 4; the signs for the feed and return ends of a circuit are given by Fig. 3. A circle is the basic symbol for all such classes of mechanism, but is seldom used alone; it is, as seen in Fig. 4, generally completed by some conventional markings (bars, squares, etc.) for rapid identification. Lettering and numbering may of course be added. When it is desirable to indicate whether a relay is normally energised, a small arrow, point up, is shown, an arrow point down indicating the reverse condition. These arrows may also be added to the signs placed alongside individual contact symbols.

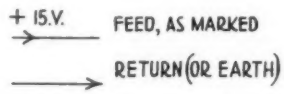


Fig. 3—Feed and return

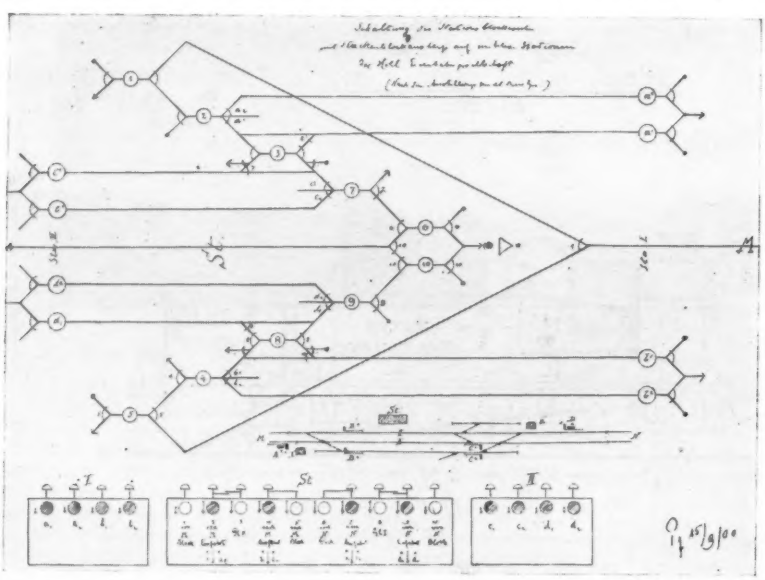


Fig. 1—A page from the diary of R. Pfeil, September, 1900, showing block circuits for a station in Holland

Description of a Typical Diagram

As a general illustration of Pfeil's circuit diagrams Fig. 5 is given. It is now customary to draw the circuits in vertical lines, but this is not essential, of course, and the horizontal method can equally well be followed. Beginning on the left of the figure, we have "normal on" contact makers on signal arms 1 and 2 energising a plain proving relay 1, 2. If this circuit is traced down it will be seen that in no place does an arc strike across it. It must therefore be normally energised the circuit being complete throughout. Below this will be seen the control of the normally dark diagram lamps by the T.P. relays for track sections X and Y. The small arrows duly indicate that these relays are normally energised; the contacts in the lamp circuits, being shown broken, must therefore be back contacts. The next circuit begins by passing through a normal contact on signal lever 3, then over a front contact on T.P. relay Y; after which it divides. The branch leading to the lock on the up line block instrument passes over a front contact on T.P. relay X, then one on the proving relay 1, 2, reaching the lock over a push key economiser contact, of course shown broken. The other branch leads to the lock on signal lever 2 over a catch handle contact. The third vertical circuit is for a "train waiting" bell rung when sec-

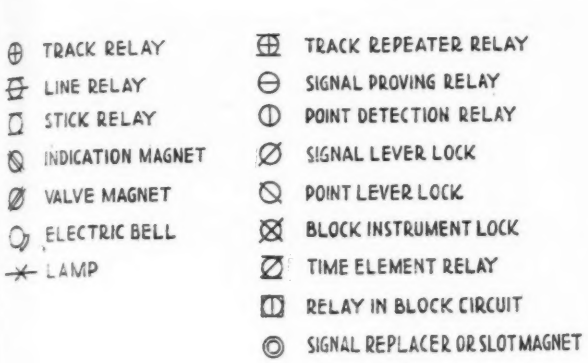


Fig. 4—A selection of apparatus symbols

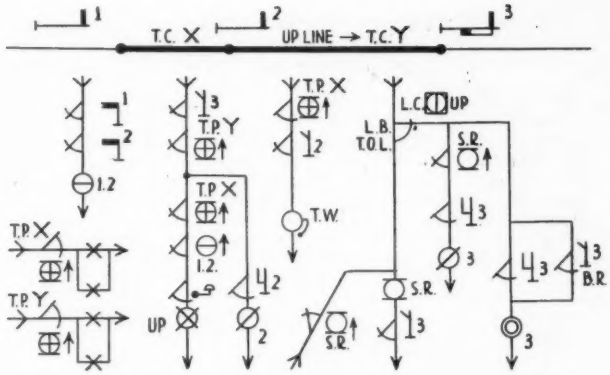


Fig. 5—Application of Central European circuit symbols

tion X is occupied with lever 2 normal. Finally, we have the control over the starting signal 3, the circuit for which begins at the contact on the up block circuit relay. The normally closed branch goes to the usual stick relay, the stick connection to which is clearly seen on the left, and from there over a contact to lever 3. When the "line clear" condition obtains the ordinary connection to relay *SR* is interrupted, and the feed established over a front contact on that relay to the lock on lever 3 through a catch handle contact. As a matter of interest, this signal is shown fitted with a replacer to be energised with the block at "line clear," the circuit to which is first completed by a catch handle contact and then maintained by a *BR* lever contact.

Although the above examples are very simple they may serve sufficiently to make clear the principles of this system of representing circuits which, as stated, has met with wide acceptance on the Continent. The one exception, already mentioned, to the stroke and arc method of designating a contact, is found in the case of the point detection contact in those power systems which employ a single detection magnet, proving correspondence between lever and function, instead of normal and reverse magnets. As such contacts are invariably of one sort and can have only one way of working they are shown by a simple cross mark thus +, with the number of the function added. Such a sign occurs, of course, only on the circuits inside a power signal box fitted with this kind of equipment.

New Station at Neuchâtel

The important junction of Neuchâtel on the Swiss Federal Railways has been enlarged and provided with new signalling and improved facilities for both passengers and goods

NEUCHÂTEL—or Neuenburg, as it is called in German Switzerland—is an important junction on the Swiss Federal Railways, situated on the lake of that name at the meeting point of the lines from Pontarlier (France), Lausanne, Biel (Basle and Olten), Berne, and La Chaux-de-Fonds. A station was first opened in Neuchâtel by the Franco-Swiss Railway Company in 1856, and was enlarged from time to time, principally in 1873, 1880 and 1901; in the last named year the opening of the direct line to Berne necessitated substantial alterations. The growth of traffic after that time led the Canton of Neuchâtel to press for a general reconstruction and in 1914 the railway authorities had prepared preliminary proposals, when the outbreak of war interfered with the scheme. In 1917, however, the project was again brought under discussion and some time elapsed before an agreement could be reached with the cantonal and municipal authorities. This was concluded in 1930 and work began.

Arrangement of Layout

Local conditions made it impossible to increase the width of the layout to any appreciable extent and a peculiarity of the new one is the great length it covers. The locomotive depot, which was opposite the old main building has been transferred to the eastern end of the station and a number of goods sheds removed to Vauseyon, a short distance west of the town. The running lines are divided into four groups and there are four platforms. No. 1 serves for special trains only, as a rule; No. 2 the Berne and Lausanne lines; No. 3 the trains to and from Biel and No. 4 the Les Verrières (Pontarlier) and La Chaux-de-Fonds routes. There is a large amount of interchange goods traffic and complete arrangements have been made for handling it and marshalling trains expeditiously. The new station buildings are a pleasing combination of modern and classical styles and are set at right angles to the tracks, an unusual arrangement for the through type of station. To please the town authorities, who assisted with a subsidy, the exterior was specially made to harmonise with the prevailing tone of buildings in the vicinity. Internal decoration comprises a number of wall paintings executed by an artist named Desoulavy. The goods station buildings are similarly well constructed and contain accommodation for the Customs & Excise and other public services. There is also a certain amount of space available for hire to merchants and others as stores, offices, and so on. It has been necessary, in order to provide adequate marshalling siding accommodation, to move the private sidings of certain firms to Vauseyon, where the filling up of a certain amount of the valley of that name has enabled much wished for space to be gained. The Postal Department has been given a new building, erected by the side of the passenger station and designed by the same architects.

Signalling Installation

The signalling of the old station was rather out of date, so much so that many pairs of points in the running lines were operated locally and merely detected by the signal transmissions. In consequence severe speed restrictions were imposed on trains arriving or departing, which was becoming increasingly unsatisfactory from the operating point of view. In addition the distance between the entrance points at each end of the station was being increased to 2,000 m. (2,187 yd.). It was therefore decided to adopt complete all-electric signalling and point working, at a cost of about 1,000,000 fr., and this effected nearly a saving in working expenses of 103,000 fr.; 16 fewer signalmen were needed. With the completion of the new signalling about the end of last year the final change from the old station was effected, after a lapse of 12 years, or 18 if all the preliminaries are included. Neuchâtel Station is now one of the finest in Switzerland and capable of dealing with heavy traffic without risk of delay. We are indebted to the *Bulletin* of the S.F.R. for the above details.

KIEL TRAMWAYS REORGANISATION.—The Kiel Tramways, owned by Allgemeine Lokalbahn und Kraftwerke A.G., of Berlin, until June 30, 1942, were taken over as from that date by the Kieler Verkehrs A.G. The share capital of the latter was increased from RM. 4,000,000 to RM. 15,000,000. On the other hand, the Kieler Verkehrs A.G. transferred own shares to the value of RM. 11,000,000 to the Allgemeine Lokalbahn und Kraftwerke A.G. The Kieler Verkehrs A.G. was called the Hafenrundfahrt A.G (Harbour Round Trip Company) until 1937, when the present name was adopted and the Holsteinische Autobus A.G. was absorbed. In 1939, the company absorbed the Kiel shipping concern, Neue Dampfer Kompagnie. The transaction with the Kiel tramways is a result of the termination of the concession granted to the Kiel tramways by the Kiel municipality; this transaction gives the Allgemeine Lokalbahn und Kraftwerke the character of a holding company; it still owns the Görlitz trams the concession for which terminates in 1947. The company's share capital is RM. 25,500,000.

Railway Engineering and Radiography

An outline of current L.M.S. practice

By E. D. Knights, B.Sc.

A NEW kind of radiation recognised by Roentgen was designated "X-rays" at a meeting of the Würzburg Physico-Medical Society in December, 1895. Patient research by many workers then established that X-rays were produced from solid targets when they were subjected to bombardment by rapidly moving electrons (negatively charged particles). It was soon found that these radiations obeyed most of the laws appertaining to light rays, and it was the discovery that they could be diffracted by certain crystals which finally settled their relationship to light rays. The only major difference concerned wavelength: that of visible light extends roughly from $3{,}300 \times 10^{-8}$ cm. to $7{,}700 \times 10^{-8}$ cm.; X-rays are shorter and extend from $0{\cdot}06 \times 10^{-8}$ cm. to $1{,}019 \times 10^{-8}$ cm.

When X-rays penetrate a substance opaque to visible light they are affected in much the same way as a beam of light shining into a fog. They are partly transmitted, partly absorbed, and partly reflected or scattered; the amount of each depends on the substance and its thickness. Substances of high density and atomic weight usually absorb X-rays to a much greater extent than those of light weight, for the latter tend to scatter the rays rather than absorb them.

Generation of X-Rays

Reference has already been made to the fact that when electrons moving at high velocity impinge on solid matter X-rays are produced, and to move at this velocity the electrons must be produced from electrodes within a sealed vessel or tube. The earlier tubes were not completely evacuated, but during 1913 Coolidge introduced a tube which is evacuated to such a high degree that there is no gas to ionise, and consequently it is difficult to pass a current. The electrons have then to be provided either by emission from a hot filament cathode, by heated oxide coating on the cathode, illumination of the cathode by ultra violet light or other methods. The "hard" or shorter wavelength rays are the most penetrating, and are produced from targets of molybdenum or tungsten at the higher voltages.

X-ray generators are now available commercially up to 400,000 volts as a fixed unit, and up to 300,000 volts as mobile units. Cooling of the anode or target is carried out either by an air radiator on the outside portion, by circulating water, or by oil, since approximately 99·8 per cent. of the energy input reappears as heat, and must be dissipated to preserve the life of the tube. Even so it is obvious that, since electrons are continuously produced at the filament or cathode, this source will in time become exhausted and fail. Most modern tubes, however, when used with care have a useful life of 1,000 working hours or more.

Safety Precautions

The British X-Ray and Radium Protection Committee was formed in 1921 and continues to issue recommendations for operators. In X-ray rooms shielding from direct and stray radiations can be arranged by lining the room with lead sheet or other material, the thickness of which is governed by a scale drawn up by the British X-Ray and Radium Protection Committee and based on the voltage used on the tube. In places where this is not possible, it is usual for the operator to control the working of the set from some distance and to have a lead screen between him and the subject.

Observation and Recording of Results

The effect obtained when X-radiation passes through an object depends on the opacity of the latter. Aluminium, steel and copper increase in opacity in the order given. Since aluminium and its alloys are relatively so translucent to X-rays the testing of this metal can generally be made by visual inspection of a fluorescent screen placed between the observer and the object so as to catch the transmitted rays. Cavities and spaces in the metal then appear as bright patches on the screen, and a rapid diagnosis can be made. With the more opaque metals, however, resort is generally made to photographic effects, and films about 0·010 in. thick, coated on both sides with emulsion, are generally used. An outline arrangement for taking a radiograph is shown in Fig. 1. The film is contained in a suitable holder or cassette, being sometimes enclosed in intimate contact with intensifying screens to increase the density of the image. The influence of such intensifying screens can be seen by a comparison of Fig. 3B and C. Lead sheet or other type of masking is fitted round the object to be examined, as well as on both the top and bottom of the film cassette, to prevent as far as possible both the direct and scattered rays from fogging the film.

The interpretation of the shadows seen on the film after development constitutes perhaps the most skilled part of radiographic technique. Changes of surface contour produce their effects as well as changes of internal soundness, and the divergence and direction of the incident beam must be considered in judging the displacement of the final image.

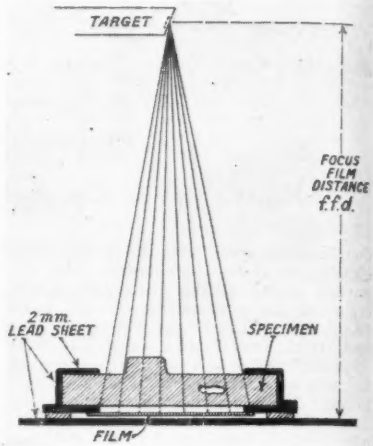


Fig. 1—Outline arrangement for taking a radiograph

Examples of Radiographic Work

Radiography in engineering practice has been found of most value in connection with the study of welds, castings and complicated assemblies. In the former

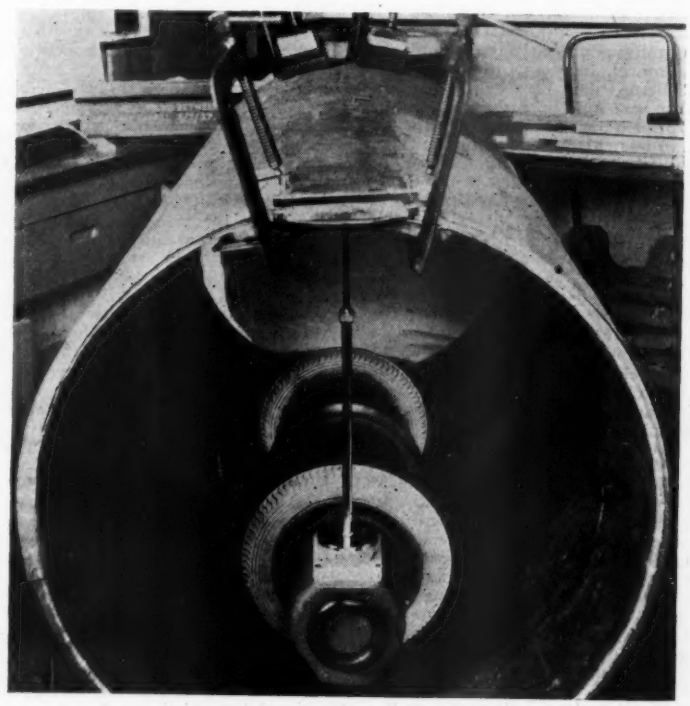


Fig. 2—Examining a pressure vessel

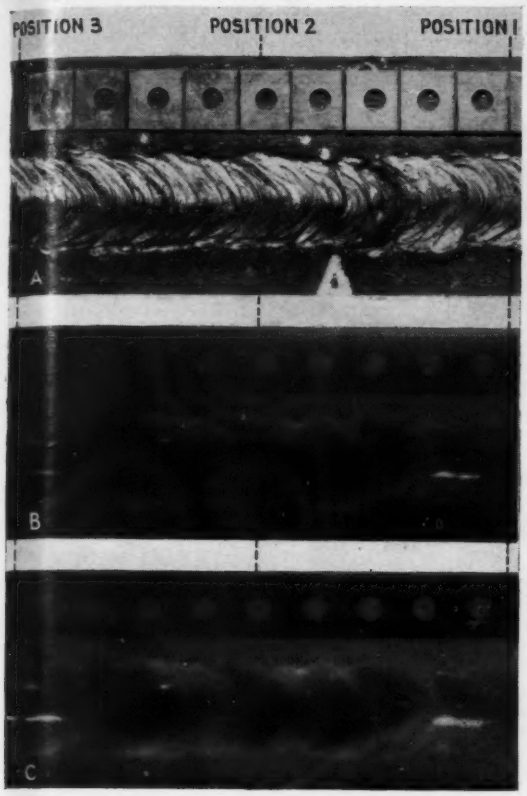


Fig. 3—A, butt-welded steel plate with penetrameter. B, radiograph without screens. C, radiograph with screens. D, cross section position 3, showing cavities

unsoundness of the weld metal, imperfect penetration of the weld bead and cracks in both bead and parent plate may be sought for. In castings, any such defects as porosity, draws and hot tears are likely to be revealed. Complicated assemblies and intricate mechanisms may sometimes yield information of value regarding faulty construction or design when submitted to X-ray examination. The presence of an opaque foreign body in an engineering detail is sometimes detected by radiography.

Fig. 2 illustrates the arrangement of an X-ray tube inside a pressure vessel for the purpose of radiographing a longitudinal weld running down the upper side. The focus film distance gauge is screwed into the aperture of the tube pointing towards the weld, and assists in the proper location of the tube. The film in its holder rests on the top, while lead sheet masking is clamped along the weld, and lead identification letters are attached to the specimen by means of plasticine.

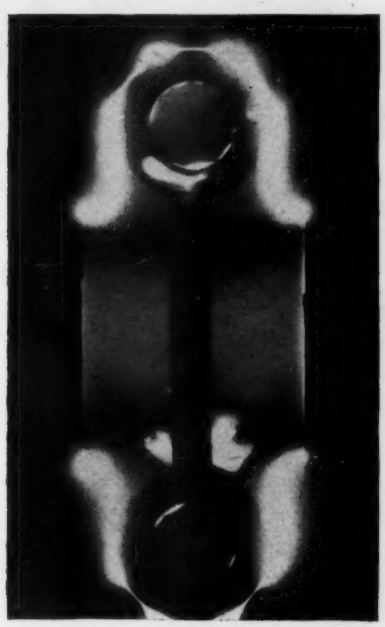


Fig. 5—Zinc-base alloy die casting

Fig. 3 illustrates a butt welded specimen in steel and the radiographs obtained from it. The perforated strip lying upon the weld is a steel penetrameter ground with steps of 0·005 in. which assists in determining from the final film the thickness of any defect which has been detected. One looks for the first penetrameter hole which can just be observed on the film and this guides one to the appropriate step thickness which is involved. The specimen under consideration was 18 mm. thick, and in the radiographs the end hole can just be seen, consequently any defect not shown on the radiograph is less than 0·127 mm. (0·005 in.) in thickness or 0·7 per cent. of the thickness of the plate.

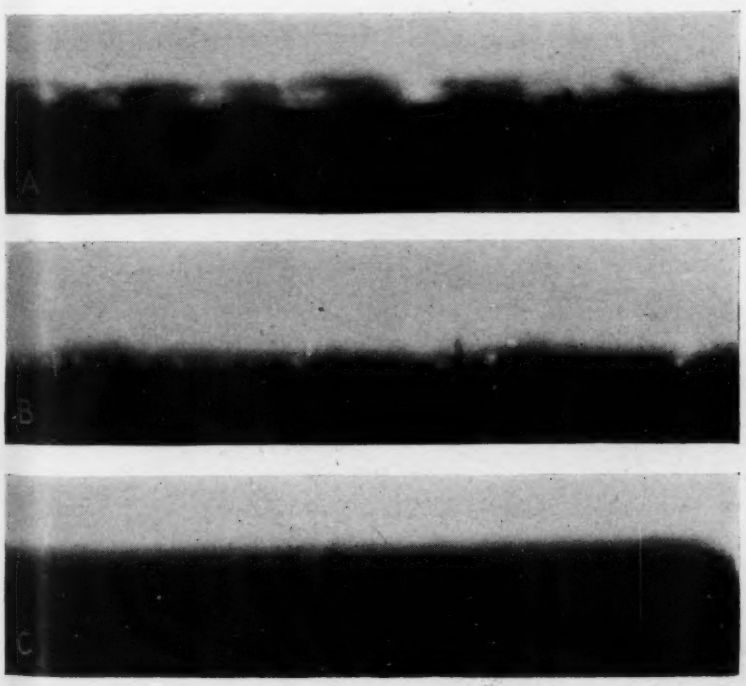


Fig. 4—A and B, poor fillet welds, and C, good fillet weld

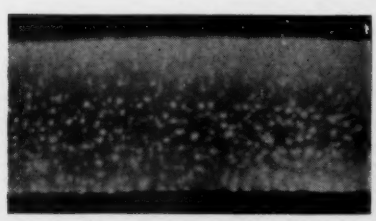


Fig. 6—Cast-steel wagon-wheel spoke

The surface ripple on weld beads becomes evident on the radiographs, and it is always a help if it can first be ground away to simplify the result. In the present case the weld surface or reinforcement was removed on the side nearest the film but the ripples due to the remaining unground bead can still be seen. Light markings on the prints are due to imperfect root penetration of the weld, and a comparison of B and C (Fig. 3) reveals the greater contrast in the latter due to the intensifying screens. Incidentally, prints taken from radiographs are generally inferior to the original film and lose in definition when reproduced as printing blocks. Fig. 3D is a photograph of the etched section of the weld in Fig. 3A at position 3, which was shown to be defective by X-rays.

Although the radiography of butt welds is a relatively simple matter, fillet welds present more difficulties. With care, however, imperfect root penetration shows on the radiographs of fillet welds as illustrated by comparisons of Figs. 4A, B, and C. The first is a bad weld in $\frac{5}{8}$-in. steel plate obtained by ranging the incident beam at an angle of 20 deg. to the vertical leg. The detection of cracks in fillet welds is an extremely difficult matter and radiography can seldom be relied upon for this purpose.

As to castings, Fig. 5 shows a die cast zinc base alloy pipe cleat. The screwholes have been filled up with masking material, and masks have similarly been placed all round the cleat. Very large cavities are visible at the junction of the curved portion to the straight portion, and their presence was confirmed by sectioning the detail. Fig. 6 shows a railway wagon wheel spoke of foreign origin, and it is obvious that this wheel was cast from unkilled steel as it is full of small blowholes. Fig. 7A is the radiograph through the suspension lug of an electric traction motor carcase, and reveals a long cavity near mark B, with two small cavities between marks B and I. These cavities were completely invisible by superficial examination, but their presence was confirmed by sawing the lug down the middle and hinging back the two portions as shown in Fig. 7B.

Fig. 7A—(above) radiograph of cast-steel motor carcase

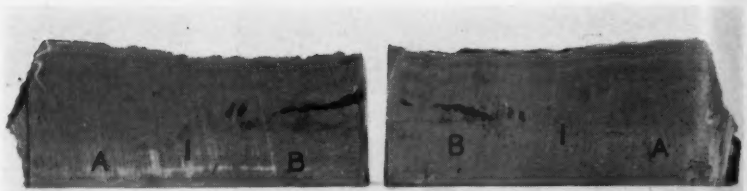
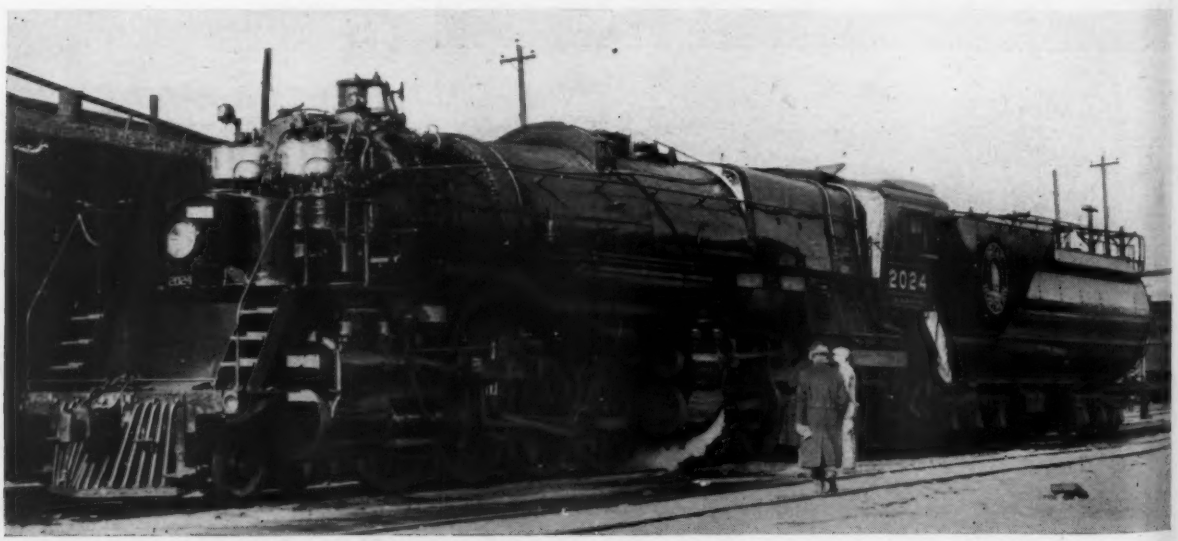


Fig. 7B—(right) cast-steel motor carcase cut open

Mallet Locomotives for Ore Traffic, Great Northern Railway, U.S.A.

The better to cope with the very great ore traffic dealt with on the Great Northern Railway, U.S.A., and which in the month of July, 1942 alone involved the use of 56,976 wagons carrying 3,671,437 tons of ore, some articulated locomotives having the 2-8-8-0 wheel arrangement have been introduced, and one of these, by the courtesy of our American contemporary, the *Railway Age*, is illustrated herewith. They are single-expansion engines, each together with its tender in working order weighing 381 tons. The boiler pressure is 300 lb. per sq. in., and the heating surface including superheater 7,970 sq. ft. The grate area is 95 sq. ft.

The ample coal and water capacities of the tender permit the avoidance of many stops. The coal capacity is 24 tons and water capacity 21,500 gal. Both the engines and wagons are thoroughly overhauled during the winter so that only running shed attention is necessary during the ore traffic season. To ensure maximum utilisation of the engines, a system has been worked out whereby each locomotive makes a round trip of 215 miles daily.



N.3 type locomotive developed by the Great Northern Railway, U.S.A., for the ore service

RAILWAY NEWS SECTION

PERSONAL

Sir George Clemens Usher, Director-General of Fighting Vehicles Supply at the Ministry of Supply, has resigned.

G.W.R. Appointments

The Great Western Railway has announced the following appointments :—

Mr. R. F. Hurford, Trade Advertising Agent, Superintendent of the Line's Office, Paddington, to be Trade Advertising Agent & Acting Publicity Officer, Superintendent of the Line's Office, Paddington.

Mr. R. Dixon, Dock Manager, Plymouth, to be Assistant to Chief Docks Manager, Cardiff.

Mr. L. J. L. Lean, Depot Manager, Inland Sorting Depot, St. Mellons, Cardiff, to be Dock Manager, Plymouth.

Mr. R. H. Rice, Assistant Dock Manager, Newport Docks to be Depot Manager, Inland Sorting Depot, St. Mellons, Cardiff.

Mr. F. C. Coleman, Head of Commercial Section, Chief Docks Manager's Office, Cardiff, to be Assistant Dock Manager, Newport Docks.

Mr. R. J. Jones, Chief Clerk, Swansea Docks, to be Assistant to the Dock Manager, Swansea Docks.

Mr. I. C. Thomas, Head of Coal Shipping Section, Barry Docks, to be Chief Clerk, Swansea Docks.

Mr. F. G. Dean, Chief Clerk, Divisional Superintendent's Office, Swansea, to be Assistant Divisional Superintendent, Birmingham.

L.M.S.R. Appointments

The L.M.S.R. has announced the following appointments :—

Mr. G. A. Gribble, Assistant to District Goods Manager (Operating), Birmingham, to be Assistant to Operating Manager (Goods Station Working & Cartage), Glasgow, *vice* Mr. G. S. Paterson, retiring.

Mr. F. E. Newman, Goods Agent, Waterloo Dock & Great Howard Street, to be Goods Agent, Birkenhead, *vice* Mr. A. Rowland, retired.

Mr. J. H. Frazer, Goods Agent, Sandon Docks & North Docks, to be Goods Agent, Waterloo Dock & Great Howard Street, *vice* Mr. F. E. Newman.

Mr. C. F. Beck, Joint Goods Agent, Burton (L.M.S.R. & L.N.E.R.), to be Goods Agent, Aston, *vice* Mr. G. Stewart, promoted.

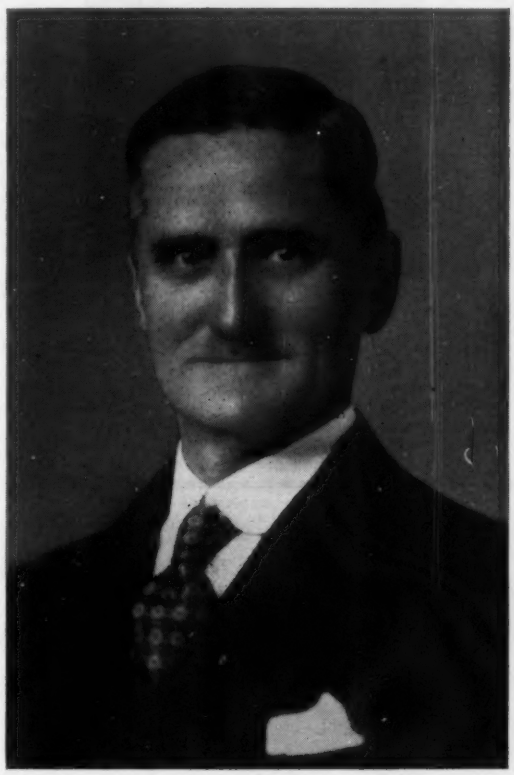
Mr. H. Smith, Stationmaster & Goods Agent, Beeston, to be Goods Agent, Longport, *vice* Mr. S. Palfreyman, retired.

Mr. W. Jinks, Stationmaster, Chesterfield, to be Stationmaster & Goods Agent, Beeston, *vice* Mr. H. Smith.

Mr. D. M. Smith, Clerk-in-Charge, Parcels Accounts Office, Glasgow (St. Enoch), to be Stationmaster, Edinburgh (Princes Street), *vice* Mr. H. B. Douglas, retired.

Mr. F. J. Pepper, Draughtsman, Chief Mechanical Engineer's Department, Derby, to be Works Manager, Chief Mechanical Engineer's Department, Kilmarnock, *vice* Mr. A. S. Bennett, retired.

Mr. L. C. Glenister, Assistant Accountant, L.N.E.R., who has been appointed Chief Accountant in succession to the late Mr. George Sutherland, received his early training in accountancy in the Borough Treasurer's Department at Hastings from 1903 to 1911, but in March of the latter year he joined the former Great Northern Railway, and was posted to the joint lines section at Kings Cross. A year later he was transferred to the bookkeeping section, where he was employed until, in November, 1914, he joined the Queen's Westminster Rifles (16th London Regiment), with which he served until 1919. In April of that year Mr. Glenister returned to the bookkeeping section at Kings Cross, where he remained until the grouping in 1923, when he was transferred to the Chief Bookkeeper's Office of the L.N.E.R. In 1928 he was appointed Expenditure Assistant to the Chief Bookkeeper, and on January 1, 1935, was further promoted to be Locomotive Accountant, North Eastern Area, at Darlington. He was appointed Assistant Accountant in 1937.



Mr. L. C. Glenister
Appointed Chief Accountant, L.N.E.R.

Mr. T. Condon was nominated for the Presidency of the Irish Tourist Association, in succession to Senator P. Hogan, at the recent monthly meeting of the directors. Mr. B. M. Egan, Mr. J. W. Mongan, T.D., and Senator Hogan were nominated as Vice-Presidents. The offices will be filled at the annual meeting to be held on October 29.

Institute of Transport

Among those elected recently to Corporate Membership of the Institute of Transport are Mr. F. D. Arney, Assistant General Manager, Port of Bristol Authority ; and Mr. H. C. Drayton, Executive Chairman, Transport Services Limited. Those elected to Associate Membership include Mr. F. E. Birch, District Traffic Superintendent (Railways), London Passenger Transport Board ; Mr. J. McKee, Northern Ireland Road Transport Board ; Mr. G. H. Searle, Assistant Director of Transport, Ministry of Food (Bacon & Fish Divisions) ; and Mr. F. A. Winter, London Passenger Transport Board.

Mr. J. W. Ramsbottom, M.A., M.Com., has been appointed Educational Adviser to the Institute of Transport.

The following have passed Institute of Transport examinations (referred to also in our September 11 and 18 issues) for prisoners-of-war in Oflag VI B and Stalag XX A. :—

Graduateship, Parts 1 *&* 2 : Lieutenant D. M. Colquhoun (Oflag VI B), L.M.S.R., Dundee.

Graduateship, Part 1 : Captain W. R. Veryard (Stalag XX A), G.W.R., Bridgend ; Lieutenant I. E. Garfield (Oflag VI B), L.M.S.R., Birmingham ; Captain R. W. Wheeler (Oflag VI B), Southern Railway, London ; and Sergeant J. F. Hooper (Stalag XX A), Port of London Authority, London.

Graduateship, Part 2 : Captain J. N. Robinson (Oflag VI B), L.M.S.R., Derby.

Associate Membership, Part 2 : Captain A. Forester Fielding (Oflag VI B), L.M.S.R., Huddersfield ; and Captain J. N. Robinson.

(As we recorded last week, Oflag VI B since has been dissolved, and the prisoners are being moved to other camps.)

We regret to record the death on September 26, at the age of 80, of Major A. D. G. Shelley, late Royal Engineers, Chairman of the Bombay, Baroda & Central India Railway Company. A service was held on September 30 at St. Mary's Church, Guildford, before the burial at Guildford Cemetery.

Sir E. Julian Foley is to retire at the end of this month from the position of Deputy Director-General (Shipping—Group 1), Ministry of War Transport, which he has occupied since May, 1941; previously he had been Secretary, Ministry of Shipping, since 1939.

Mr. Gibson Jarvie has resigned from the position of North-Western Regional Port Director ; he will continue with his duties until a successor is appointed and is remain-

ing at his headquarters in Liverpool. Mr. Jarvie states that the reason for his resignation is the increased scope of the review entrusted to Sir John Forster, which originally had been intended to be confined to conditions obtaining under the Merseyside Dock Labour Scheme, but which now included the port administration.

Mr. W. Core, Manager of the London Office of Alfred Herbert Limited, Coventry, has been appointed a Departmental Director.

We regret to record the death on September 30, at the age of 69, of Mr. Frank Neal, a Director of the Standard Piston Ring & Engineering Co. Ltd. and of Warner & Co. Ltd.

Mr. Harold T. Barnett, acting on medical advice, has resigned the Chairmanship of the Devon General Omnibus & Touring Co. Ltd., but retains his seat on the board. Mr. Sidney Garcke has been elected Chairman.

Mr. Walter Gott, Commercial Advertising Officer (Railways & Properties), London Passenger Transport Board, as was announced in our August 14 issue has assumed charge of both the road and rail sections of the board's commercial advertising, with the title of Commercial Advertising Officer. The retirement of Mr. H. L. Spratt from the position of Commercial Advertising Officer was recorded in our August 31 issue. Mr. Gott commenced his business life on the old Great Northern Railway at Bradford and became the company's Advertising Manager at Kings Cross. He left the Great

Mr. Walter Gott, O.B.E.

Appointed Commercial Advertising Officer, London Passenger Transport Board

Northern Railway and joined the Underground group as Passenger Agent of the Piccadilly Tube; subsequently he became Assistant Manager to the Partington Advertising Company, then one of the advertising contractors to the Underground. Up to 1923 the advertising on the Underground group was handled by various contractors, but in that year the Underground assumed the conduct of the business. Mr. Gott then returned to his old organisation, and created his present department. With the formation of the London Passenger Transport Board in 1933 the Metropolitan Railway came into the scheme. The commercial advertising on that line, which previously had been handled by contractors, came under the present department in 1934. During the last war Mr. Gott was a Captain in the Royal Engineers, and was seconded in 1916 to the Shipbuilding Branch of the Admiralty, where he occupied the position of Statistical Officer. He was awarded the O.B.E. for his war services.

We regret to record the death on September 23, in Calcutta, of Mr. D. A. G. Brown, General Manager in India of Heatly & Gresham Limited.

Indian Railway Staff Changes

Mr. A. G. Engelfield has been appointed to officiate as Deputy Chief Operating Superintendent, N.W.R., as from May 18.

Mr. P. N. H. Baker has been confirmed as Divisional Superintendent, E.I.R.

Mr. I. H. Lightowler has been confirmed as Deputy Controller of Stores, E.I.R.

Mr. W. T. Griffiths has been appointed Deputy General Manager (War Planning), G.I.P.R., as from May 18.

A corner of the "observation dinette" which forms the rear portion of the second coach of the Denver & Rio Grande Western Railroad's new Prospector train, introduced to provide a fast night service between Denver and Salt Lake City. The "dinette" has table accommodation for eight and is adjoined by a kitchen compartment

TRANSPORT SERVICES AND THE WAR—160

The Winter Timetables

The winter timetables of the four main-line railways operate from Monday, October 5, and, apart from the withdrawal of various duplicate trains that were run during the summer season, display very few alterations. On the L.M.S.R. the 4.5 p.m. from Euston to Blackpool starts at 4 p.m., and the 8.30 a.m. from Carlisle to Euston at 8.25 a.m.; the 10 a.m. from Euston is due in Glasgow (Central) at 6.50 instead of 6.45 p.m.; the 7.30 p.m. from Euston reaches Perth at 6.34 instead of 6.16 a.m. and Inverness at 10.42 instead of 10 a.m.; the 10.55 p.m. from Euston now includes the Preston sleeping cars previously run on the 10.50 p.m. down. In the middle of the day two of the four through Bakerloo electric trains to and from Watford are withdrawn; the remaining two, with the two Euston electric trains each hour, provide a 15 min. service between Queen's Park and Watford.

A regular traveller's identity badge issued during the 1914-19 war

On the L.N.E.R. the relief 9.15 a.m. from Kings Cross to Newcastle and the 12 noon from Newcastle to Kings Cross are withdrawn; the 9.50 a.m. from Kings Cross to Edinburgh calls at Peterborough instead of Grantham, and is non-stop from there to York. The 10 a.m. Flying Scotsman omits Peterborough and resumes its time-honoured Grantham stop, calling thereafter at Doncaster to York; the latter is due in Edinburgh at 6.50 instead of 6.45 p.m. The 1.15 p.m. from Kings Cross to Leeds starts at 1.10 p.m.; and the 11.15 p.m. sleeping car train from Kings Cross reaches Newcastle at 7 a.m. instead of 6.30 a.m. In the North Eastern area the 5.50 p.m. semi-fast from York to Newcastle starts at 4.50 p.m., thereby splitting up the afternoon and evening service along this route into more even intervals. On the Great Eastern Section the 10.20 a.m. and 4.20 p.m. from Norwich to Liverpool Street start at 10.15 a.m. and 4.15 p.m. respectively; the latter arrives in London 8 min. earlier, at 7.10 p.m. A valuable cross-country improvement, without additional train mileage, is that the 4.50 p.m. from Rugby, L.M.S.R., to Peterborough East runs through to Norwich, arriving at 10 p.m., with a corresponding through return service from Norwich at 7.25 a.m., reaching Rugby at 11.52 a.m.; important connections are made with L.M.S.R. expresses from and to the North at Rugby. On Fridays the 5.49 p.m. express from Liverpool Street is divided, the Norwich restaurant car train running non-stop to Cambridge at 5.49 p.m., and the Hunstanton section following at 5.52 p.m.

On the Great Western Railway the 10.30 a.m. down Cornish Riviera Limited now calls at all stations beyond Truro and reaches Penzance at 6.20 instead of 6 p.m. The 9.25 p.m. from Taunton to Barnstaple and the 9.30 p.m. to Minehead leave at 8.15 and 8.20 p.m. respectively, and are no longer in connection with the 4.15 p.m. from Paddington. The 8.40 a.m. from Birkenhead to Paddington leaves at 8.35 a.m.; the 6.10 p.m. from Paddington reaches Birmingham at 8.54 instead of 8.47 p.m., and Birkenhead at 12.46 instead of 12.41 a.m. Certain relief trains are continued, including the 8.50 a.m. from Paignton, running daily from Newton Abbot independently of the 8.45 a.m. from Plymouth to Paddington, not calling at Exeter, and reaching London at 1.35 p.m.; also the 3.55 p.m. express from Paddington to South Wales on Fridays.

On the Southern Railway the 5.36 a.m. from Exeter to Ilfracombe, in connection with the 1.25 a.m. from Waterloo, now has a through portion from Yeoford to Okehampton, Bude, and Launceston, where connection is made with the 8.24 a.m. to Padstow, thus providing a new early morning service from London to these branches. The 4.35 p.m. from Waterloo reaches Swanage at 8.36 p.m., 15 min. earlier. A late evening service is provided at 9.10 p.m. from Ramsgate and the Kent Coast line to London by extension of this stopping train from Chatham *via* Dartford to Charing Cross; also the 9.55 a.m. from Ramsgate to Victoria leaves at 9.45 a.m.

There are no further reductions of the restaurant car services on the four main-line railways.

Fewer L.M.S.R. Suburban Trains

To save electric current, the L.M.S.R. withdrew during slack hours certain lightly-loaded suburban trains on October 5. The chief changes are :—

London Transport through tube trains between Queens Park and Watford. From 10 a.m. to 4 p.m. (Mondays to Fridays) and after approximately 8 p.m. (weekdays) two trains an hour have been withdrawn in each direction. (Reference to this is made above.)

Watford-Broad Street (electric). Through services are suspended on Saturdays after 3 p.m. Passengers change at Willesden Junction between 10 a.m. and 4 p.m. (Mondays to Fridays). Half-hourly Sunday through trains are withdrawn after approximately 8 a.m.; passengers change at Willesden Junction.

Watford-Ricksmansworth branch. The service between 10 a.m. and 4 p.m. (Mondays to Fridays) is withdrawn, London Transport bus services operate between these places.

Richmond-Broad Street service. Electric trains have been reduced from six-car to three-car units during non-peak hours.

Green Line Coach Withdrawals

Since the publication of our list (September 18 issue, page 282) showing additional or augmented bus services arranged in part replacement of the withdrawn Green Line coach services, it has been found possible to provide improved alternative arrangements in some cases. One is in respect of coach route 23 (Ascot) and 23A (Sunningdale). Here the alternative facilities have in fact taken the form of a new London Transport bus service, route 443, linking Staines Station, Egham, Virginia Water, and Ascot. In addition, the Aldershot & District Traction Co. Ltd. is maintaining an hourly bus service (route 1) linking Egham Station, Virginia Water, and Sunningdale Station, as part of a strengthening of its Egham-Sunningdale-Aldershot route. Another case of improved facilities is in respect of the part replacement of Green Line coach service No. 35 to Amersham and Aylesbury. It was originally intended to introduce a London Transport bus service between Amersham and Wendover, but actually a through route (No. 359) has been introduced jointly by London Transport and the Eastern National Omnibus Co. Ltd. linking Amersham Station, Little and Great Missenden, Wendover, and Aylesbury.

Co-ordination at Plymouth

The arrangements recently completed between the Plymouth Corporation Transport Department and the Western National Omnibus Co. Ltd. for co-ordinating bus services came into operation on October 1. The joint working arrangements provide several new through facilities. From October 1 return tickets on stage carriage services are neither issued nor accepted for journeys wholly within an area bounded by Tamerton, Buckland, Milton Combe, Yelverton, Dousland, Cornwood, Shaugh Prior, Lee Mill, Brixton, and Wembury. As from October 1 also the issue of season tickets for journeys within this area for which the adult single fare is less than 1s. 3d. has been suspended, and no weekly tickets are now issued for less than 7s. 6d. a week covering 12 journeys. Since October 1 no parcel traffic can be dealt with between Plymouth and Eggbuckland, but other parcels traffic facilities previously in force are being continued.

Government Road Haulage Scheme

The general cargo and meat moved in the week ended September 11 totalled 165,767 tons. This is the highest weekly total since June 26, when the total of 171,300 tons included a number of items carried in previous weeks under continuing contracts since completed.

The Airways Special Train

A Question in Parliament (see page 357) recently drew attention to the service of special trains, composed of two or three coaches, which operates non-stop between a West Country airport and London in connection with the aircraft of the British Overseas Airways Corporation, and allies, to and from Lisbon.

Sheffield-Doncaster Through Buses

The through bus service between Sheffield and Doncaster has been suspended on the instructions of the Regional Transport Commissioner, and the bus service is now working only between Rotherham and Doncaster. The Sheffield-Rotherham section is covered by a tram service.

A.R.P. on the S.R.

Air raid exercises, arranged by the Welfare Officer, who is responsible for A.R.P. training, are held from time to time at all the principal Southern Railway depots, stations, and so forth. In the London area, for example, such exercises are held at no fewer than 130 places in co-operation with the local authorities.

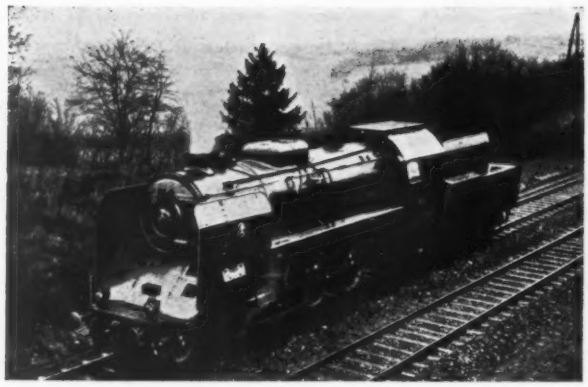
Daylight Saving

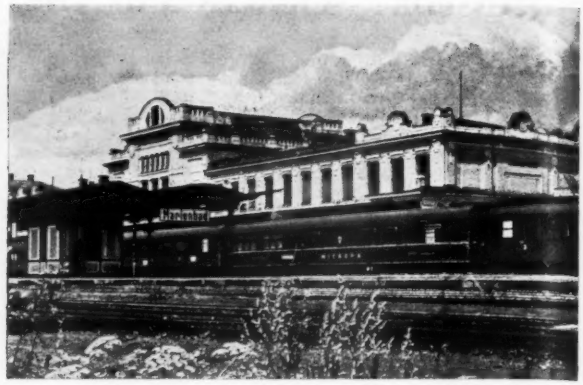
Summer daylight saving came into force throughout Australia on Sunday, September 27, and is due to be continued until March 28, 1943.

The Government of Eire has made an Order extending summer time throughout the coming winter. The Order does not alter the meaning of the expression "period of summer time" in the Road Traffic Act, 1933, and accordingly lighting up hours from October 4 to April 17, 1943 (inclusive), will be the period beginning half an hour after sunset and expiring half an hour before sunrise.

New Zealand Railway Precautions

In the report of the General Manager on the working of the New Zealand Government Railways during the financial year ended March 31, 1942, it is stated that twelve divisions of the Railways Emergency





Left : A modern Pacific-type express locomotive of the Railways of the Protectorate of Bohemia & Moravia, built at the Skoda works, Pilsen. Right : Marienbad Station, in Sudetenland

Precautions Service, which was established as a separate branch of the Emergency Reserve Corps on February 11, 1942, are now functioning at main railway centres throughout the Dominion. The total membership is approaching the 15,000 mark. Emergency equipment in considerable quantities has been made available during the course of the year, and with the addition of mobile fire-fighting trains, which were then about to be placed in service and located at strategic points, the Department is well organised to meet any emergency conditions which might arise as a result of offensive action by the enemy.

The Alaska Highway

It was reported from Edmonton (Alberta) on September 29 that motor lorries have already traversed all sections of the new Alaska Highway. It has now been announced that the road will be opened on Tuesday, December 1. It may be recalled that, in accordance with an agreement between the U.S.A. and Canada, reached on March 6 last, United States Army engineers immediately began the construction of a military highway through Canada to Alaska. It extends from Edmonton (Alberta), through Fort St. John and Fort Nelson (British Columbia), and White Horse (Yukon Territory), to Fairbanks (Alaska), a distance of some 1,200 miles. The highway is known as the Alcan Highway (namely, Alaska—Canada). About half the length of the new road has been metalled already, and the work is scheduled to be completed during the next seven weeks, ready for the new highway to be handed over complete to the Public Road Administration of the United States at its formal opening. At Fairbanks it links up with a 950-mile network of roads to the Pacific Ocean. In all, there are some 2,400 miles of road in Alaska, based on Fairbanks.

Strategic Considerations in Switzerland

Signs are not wanting that the important part played by railway transport in national defence, as revealed by the events that have taken place in the belligerent countries, is being well appreciated in neutral Switzerland, which is once again surrounded by warring nations, and where the general situation bears some approach to that of a besieged fortress. References appearing from time to time in the Swiss press indicate that the authorities have given very careful attention to the organisation and maintenance of the railway facilities, so that, despite the great difficulties of the time, a high standard of efficiency is ensured. The completion this summer of the electrification of the Furka-Oberalp route from Brigue to Disentis, which after the last war seemed unlikely ever to take place, combined with the adoption on that route, the Brigue-Visp-Zermatt, and the Schöllenen (Göschenen-Andermatt) lines, of the same voltage as the Rhaetian Railway—11,000, $16\frac{2}{3}$ cycles a.c.—has resulted in an extensive route of metre-gauge electrified lines, worked on a uniform system and over which much of the rolling stock is interchangeable in case of need. These railways form a valuable means of communication across a region where others are awkward or lacking, and the ability to work them as a unified group is clearly recognised to have valuable military advantages.

New Rail Cuts in France

New cuts in French passenger train services were introduced on October 5, according to the Vichy radio. Members of the public have again been asked not to travel except on urgent business.

Madagascar and its Railways

The recent Allied activities in Madagascar have now placed in our hands virtually the whole island and its transport. The following announcement was issued by the G.O.C.-in-C., East Africa : " This morning (September 29) our forces made a further landing at Tulear, on the south-west coast of the island, and the port was occupied without opposition. Our columns, moving east and west along the Antananarivo-Brickaville road, have now made contact, thus putting the principal railway of Madagascar into our hands."

Passenger-Fare Increase in Finland

Further details are now available concerning the passenger fare increases on the Finnish railways as from October 1. The increase in the single fare averages 20·3 per cent., return fares are increased by 22·6 per cent., and sleeping car supplements by 18·3 per cent.

Further Curtailment of Hungarian Railway Services

Train services in Hungary were again curtailed throughout the country, as from September 9. Various fast and stopping trains were withdrawn, and on certain secondary lines trains now operate on Sundays and holidays only. The statement issued by the Hungarian State Railways said that these additional restrictive measures had become necessary in order to save coal.

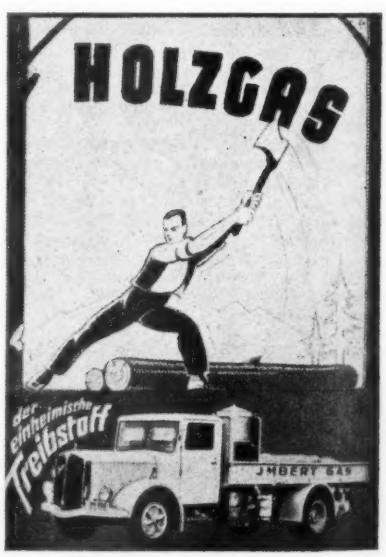
As a result of blackout measures in Hungary, many night trains have been cancelled, according to a later Vichy radio announcement. These trains are stated to have been replaced by extra services during the hours of daylight.

Italian-Roumanian Air Line

An agreement was reached some time ago between the Italian air company Exenit and the Roumanian Lares (Liniile aeriene Romane exploatete cu statul) for the establishment of a joint air line between Milan and Bucharest, *via* Venice, Zagreb, and Zemun (for Belgrade) ; the service began operating early in July last. (See also our September 4 issue, page 234.)

Balkan Through Goods Traffic

Through goods traffic to Istanbul, without transhipment at Svilengrad, was resumed on August 1. An international goods train timetable conference was held in Sofia during the last week in July, and was attended by representatives of the German, Italian, Hungarian, Croatian, and Bulgarian railways. The principal subject was the running of trains for the transport of vegetables from Bulgaria to Italy and Germany, beginning in the middle of August.



Recent Swiss advertisement for wood-gas generators for road lorries, advocating the use of home-produced fuel

London Passenger Transport Board

Appointment of members

The most recently-established public board in Great Britain concerned with the operation of transport services, and the only one which is responsible for maintaining both railway and road services, is the London Passenger Transport Board. As such, its organisation may be expected to be taken as a basis for discussions concerning the establishment of any similar boards, and it is of interest at the present time to consider the method of appointing Members of the board, who correspond approximately to the directors of a statutory company (such as a railway) or a limited company, but have no direct responsibility to the stockholders. Neither the stockholders nor the Government have any direct part in the appointment of the Members of the London Passenger Transport Board.

It may be recalled that the London Passenger Transport Board was incorporated by Act of Parliament on April 13, 1933, to take over and merge the railway undertakings of the London tube railways, and local railways (Metropolitan Railway and Metropolitan District Railway); the whole of the tram undertakings in the London area; and practically all the bus and coach undertakings working regular services wholly within the London Passenger Transport Area as defined by the Act.

Immediately after the passage of the Act of 1933, the appointing trustees were formed under the terms of the Act. Most of the appointing trustees assumed their functions *ex officio*, namely :—

The Chairman of the L.C.C.
The Chairman of the Committee of London Clearing Bankers.
The President of the Law Society.
The President of the Institute of Chartered Accountants in England & Wales.

In addition, the London & Home Counties Traffic Advisory Committee nominates its representative.

Also, at any time after the first constitution of the board, the Chairman of the board or some other Member of the board (nominated by the board for the purpose) is also an appointing trustee.

The Act requires that the Chairman and other Members of the board shall be persons who have had wide experience, and have shown capacities in transport, industrial, commercial, or financial matters, or in the conduct of public affairs, and, in the case of two members, shall be persons who have had not less than six years of experience in Local Government within the London Passenger Transport Area.

A Member of the House of Commons is disqualified from being appointed or becoming a member of the board.

The tenure of office as a Member is not less than three years nor longer than seven years as the appointing trustees may determine at the time of making the appointment. A Member may resign office by giving notice in writing to the Minister of Transport (now the Minister of War Transport).

Thus, members of the public, labour, and other interests are not directly represented. Nevertheless, the London & Home Counties Traffic Advisory Committee includes representatives of Government departments, of local authorities, of the Police Forces, of the main-line railways, of the interests of labour engaged in the transport industry, and of various road users.

The Act provides for the establishment of a Standing Joint Committee consisting of 8 members (4 appointed by the board and one by each of the main-line railway companies) for co-ordinating the board's services with the suburban passenger services of the main-line railways. The duty was imposed on this joint committee to prepare a scheme for pooling the whole of the passenger receipts of the board, and the passenger receipts of the four main-line railway companies and joint lines, attributable to passenger journeys between any two stations in the London Passenger Transport Area, or in certain cases outside that Area. The pooling scheme was confirmed on June 18, 1935, by the Arbitration Tribunal appointed under the Act, and operated retrospectively from July 1, 1933. In view of war conditions and the control of the board's undertaking by the Minister of War Transport, the London Passenger Pooling Scheme has been suspended from January 1, 1940.

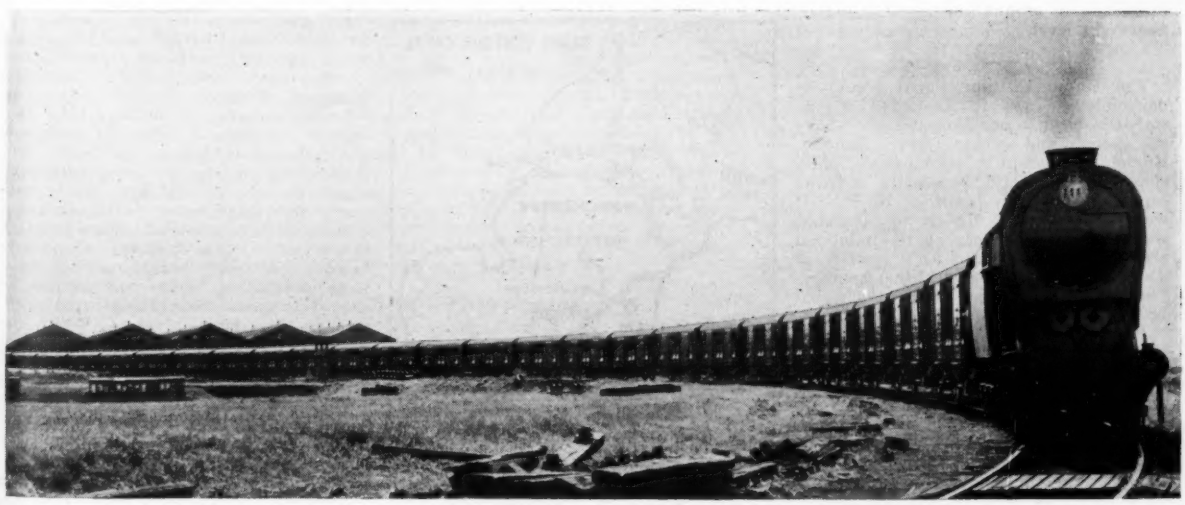
Scrap Salvage by U.S.A. Railways

As in this country, the railways in America are making every effort to salvage scrap material in order to assist the war effort and to relieve the demand on sources of raw materials.

Although the careful salvage of scrap metal and resale to the steel industry has been a normal operation of the Baltimore & Ohio Railroad for many years, salvage efforts have been greatly intensified since America's entry into the war. In the eight months between the attack on Pearl Harbour and the end of July this year, the B. & O. collected and transported to the steel mills 64,081 gross tons of ferrous scrap. It moved 63,212 gross tons of iron and steel scrap to mills in the first eight months of this year. This was nearly 4,000 gross tons more than in the first eight months of 1941, and nearly 9,000 gross tons more than in the comparable period for 1940.

In addition to the over-all scrap campaign, which is supervised by a special system-wide committee set up in response to a government request made through the Association of American Railroads, the B. & O. has carried out a number of special salvage projects recently. In one of these, the railway tore down a 70-ton unused bridge at Cincinnati, Ohio, and sent the girders to the American Rolling Mills at Middletown, Ohio, for re-processing. In another, 138 tons of rail along the B. & O.'s Crum Creek Branch near Eddystone, Pa., were torn up and sold to a scrap dealer. This branch ran along the right-of-way of one of America's oldest railways.

A third project—the scrapping of the *Director General*, a famous locomotive which was the feature of the B. & O. exhibit in Chicago's World's Fair of 1893—netted 100 tons for the steel mills. The



Southern Railway "Q.1." Class 0-6-0 locomotive leaving a Southern Railway works with a train of 40 four-wheel passenger luggage vans. The tare weight of each vehicle is 13 tons, giving a total for the complete train of 520 tons. The length of the train exclusive of engine and tender was 1,422 ft.

Director General went out of service in 1924, and had been part of the company's historical collection.

Old metal is examined by experienced men who make sure that none of it is re-usable. Whenever any equipment is torn down, or any track is removed, all the items which can be re-used are separated and sent to shops for reconditioning. Metal is the principal item of the railway's salvage campaign, but not the only one. As the result of a recent drive for rubber scrap, the railway turned over 108 tons of it to the proper agencies. Forty-five tons of the rubber came from the shops where air-brake hose is reconditioned and repaired.

Other materials which are carefully salvaged include aluminium, brass, copper, lead, white metal, zinc, bags and burlap, barrels, beltings, canvas, carpet, and rope.

The Projected Grand Contour Canal

In a book entitled "The Projected Grand Contour Canal," Mr. J. F. Pownall has set forth a scheme for utilising what he describes as a "natural canal line" running through the heart of England. (This book was reviewed in our May 29 issue, when, however, space did not permit of any details being given.) Mr. Pownall's project envisages a canal following the 300 ft. contour, which the old canal surveyors utilised to secure long reaches on a single level in many parts of the country, but of which, he maintains, greater use might have been made. He points out that between two adjacent river basins a particular reach of watershed will form the common boundary, and there along some point must be the lowest of all points on the watershed. It usually will be located where the strata are most weak and erodible, and so most typically in clays. In Central and Southern England hard and soft strata alternate. The highest summits are in the chalk, limestone, or sandstone ranges, and the lowest cols occur commonly in the clays. The latter have weathered down to similar levels and the successive lowest cols along the main watershed of England range closely around the level of 300 ft. above sea level.

Route and Construction

The Grand Contour Canal would be uniformly of 310 ft. (not 210 ft., as stated in error in our May 29 issue) above sea level, and would serve London, Bristol, Southampton, Birmingham, Manchester, Leeds, and Newcastle; existing canals would form branches to it. It would serve, either directly or by waterway connections, nearly all the industrial areas; it could act also as a method of distributing water about the country. Connections with other waterways would be by means of canal lifts.

In size, it would be larger than has been considered for any inland lock canal of corresponding character in England. A provisional width at the top of 100 ft., a depth of about 17 ft., and a clear headway of 25 ft. are proposed; overbridges would have a clear span of 80 ft. The main terminal lifts, of which there would be nine, would be 250 ft. long inside by 35 ft. wide by 14 ft. deep; lifts connecting with existing canals would be smaller.

The canal would accommodate coastal vessels of up to 1,500 tons, apart from which the main traffic would be in the form of trains of barges, from which one or more units could be slipped at required points. Such cargoes as coal, stone, salt, grain, and timber would continue to be canal mainstays; and a new class of traffic, that involving the transport of large prefabricated units, also is envisaged. Trains would travel to schedule, and a speed of about 6 m.p.h. is suggested. It is submitted by the author that the carriage rates would be low.

Working Expenses and Maintenance

Turning to the economic and financial aspects, the following mileages and estimates of cost are given:—

	Mileages	Cost a mile £	Total cost £
Canal in open ground :			
Main line	451	100,000	45,100,000
Branch line	303	75,000	22,700,000
Canal on high bank, over ground from 200 ft. to 250 ft. level :			
Main line	4	250,000	1,000,000
Branch line	2	200,000	400,000
Canal on aqueduct, over ground lower than 200 ft. :			
Main line	2½	500,000	1,250,000
Branch line	1¼	400,000	500,000
Canal in deep cutting, through ground from 350 ft. to 400 ft. level :			
Main line	12	270,000	3,240,000
Branch line	9	200,000	1,800,000
Canal in tunnel, under ground more than 90 ft. above water level :			
Main line	22	750,000	16,500,000
Branch line	13¼	500,000	6,620,000
Existing canal, reconstructed to Grand Contour Canal standards	44	50,000	2,200,000
Main terminal lifts, number 9		1,000,000 each	9,000,000
Minor lifts, for barges, number 24		100,000	2,400,000
Total of mileages	864	Total cost	£112,710,000

The author calculates the cost of a sample reach of main-line canal in the open as follows: it is estimated that there would be an average of 200,000 cu. yd. of excavation a mile, which, together with the disposal of this amount, should be accomplished within the figure of £15,000. The estimate for overbridges amounts to £22,000 a mile. Out of the £100,000 a mile allowed, according to the preceding table, £40,000 would be available for land and compensations. The canal would not pass anywhere through a large town without existing wharves, and so would not call for great extra expense in this direction. A sum of £26,000,000 would be allowed for special difficulties and contingencies, and a further £10,000,000 for the provision of basins and terminal facilities. These additions bring the total estimated cost to £150,000,000.

In connection with the proposed water-grid function of the canal, the author considers that the latter should forego tolls for the transference of water in return for relief from district rates. The working expenses of the canal as a transport concern, he maintains, thus would be reduced to maintenance, estimated at 0·04d. a ton-mile. Canal carriers' charges are estimated at 0·08d. a ton-mile, and an interest rate of 4½ per cent. is assumed, which, on £150,000,000, would represent a yearly interest of £6,750,000. A toll to yield this interest would amount to 0·32d. a ton-mile, which would bring the total charge a ton-mile to 0·44d.

Map showing the proposed route of the Grand Contour Canal

The canal company would be a private enterprise. It would be divided into operational stages of six miles each, to be owned separately by private individuals. These stageowners would be the principals of the undertaking and would elect a central board; the latter would be responsible for the construction of tunnels, aqueducts, and other special works, and the stageowners would be responsible for constructing their stages. Disparities in estimated costs existing between stages would be equalised by transfers so devised as to put the stageowners in the position of persons setting out to construct properties which would cost equal amounts by standard constructional methods. In some cases, partnerships between several stageowners might be formed.

A large amount of capital would be raised by the sale of tolls certificates, representing a number of ton-miles, in payment for which they could be tendered; the price a ton-mile at which the certificates would be sold would be settled by an agreement between representatives of the heavy industries and the canal company. Tolls certificates would not be redeemable for cash, but could be used only in payment of tolls. If trade was good, and if holders of certificates tendered them quickly, the latter eventually would dwindle to nothing. This would leave the stageowners in uncontrolled ownership, but industrial holders probably would retain large holdings, the yearly interest on which would amount to a large portion of their requirements, so that their position would be secured indefinitely. The interest rate at which the ton-miles figure of a tolls certificate would increase would be fixed provisionally at 7 per cent. a year. Existing canal undertakings would receive financial support for agreed measures of reconstruction: no general amalgamation of waterways is suggested.

Credit for Spanish Railways.—An official German news-agency report from Madrid, quoted by Reuters, states that a credit of 30,000,000 pesetas has been granted, for purposes of improvement, to the National System of Spanish Railways.

Railway and other Meetings

Great Western of Brazil Railway Co. Ltd.

The annual general meeting of the Great Western of Brazil Railway Co. Ltd. was held at River Plate House, London, E.C.2, on Wednesday, October 7. Mr. W. M. Codrington, M.C., Chairman of the company, presided.

The Chairman, in the course of his statement circulated with the directors' report and accounts, said that although the sugar and cotton crops in the north-east of Brazil were both smaller than those of the previous year, the results for 1941 were slightly better than those for 1940. These had been made possible by the slightly higher tariffs which became effective in October, 1941, and by an increase in traffic in the "dead" season between crops when normally receipts were insufficient to cover working expenses. Whilst, as a result of war conditions, costs of materials and wages in general had risen, the ratio between expenses and receipts had been reduced from 80·73 per cent. to 78·64 per cent. The tonnage of goods transported, though less than last year, was nevertheless heavy and was carried with satisfactory operative efficiency. Both wagon and train loadings were at the highest points ever reached by the company, and whilst the ton-kilometrage was a record in its history, the locomotive-kilometrage and fuel consumption showed reductions of 3 per cent. and 8 per cent. respectively.

The fact that even under these more favourable conditions no return had been earned on the share capital, was due partly to road and sea competition, but mainly to the fall in exchange which had taken place steadily during the last two decades. The company was doing more work for the community for less profit for its owners than ever before.

The condition of the track was already showing signs of considerable improvement due to the assistance derived from the 40,000 Contos Loan Fund; and the fact that the company now had 1,100 kilometres of 65-lb. rail together with a satisfactory sleeper position was indicative of the improved state of affairs. Many of the weak bridges, which had been a source of constant expense and worry, were in process of replacement by reinforced-concrete structures. Fortunately, orders for most of the material which had to be imported under this programme had been placed as soon as the first instalment was received from the Brazilian Government. The majority of it had been delivered and was already in use, and although there was still a balance to be sent from this country and the U.S.A., manufacture was well in hand and it was unlikely that there would be much further delay.

The position as to road and sea competition showed little change during the year; the proportion of sugar carried by the company had slightly increased at the expense of both these alternative forms of transport. But, since July this year, restrictions had been placed on the use of private cars and lorries in Brazil, and the railway might therefore expect to carry additional tonnage which otherwise would be lost to it.

The fuel position was satisfactory inasmuch as the company had turned almost exclusively to firewood, which now formed 90 per cent. of the total fuel consumption. Thanks to the prevision of the General Manager, properties had been acquired adjacent to the line from which a substantial proportion of the company's firewood requirements for a considerable period could be obtained. Had the company been obliged to import coal on a large scale under present war conditions, working expenses would have risen considerably. A rise in the price of locally purchased firewood as a result of an increased demand had to be expected.

The difficulties which for so long had been experienced in remitting sterling from Brazil had disappeared, and this had enabled sufficient remittances of sterling to be made to enable arrears of interest for the half-year period ended December 31, 1937, up to a similar period ended December 31, 1939, to be overtaken. Further remittances were on their way, and once these were received more arrears of debenture interest would be paid.

Reports of the new crop prospects were reassuring, and it was expected that the railway would have a greater amount of tonnage to handle than during the year under review. Provided that shipping facilities were available in sufficient quantity, the company's prospects would therefore appear to be somewhat better. No one could tell what increased costs the company would have to meet as a result of war conditions, and from any narrow margin of profit which might remain it had still to find a substantial sum to overtake the arrears of the debentures.

To Dr. Gudin he extended grateful thanks for the close attention which he unfailingly gave to the company's affairs, and which was now more than ever essential under war conditions. To Drs. Baptista and Lins, representatives in Rio and to Dr. Leão, the General Manager in Pernambuco, he sent thanks and appreciation for their continued zeal and capable guidance of the company's affairs under increasingly difficult conditions.

The report and accounts were adopted, and at an extraordinary general meeting held subsequently, resolutions were passed providing for the conversion of the shares of the company into stock.

Questions in Parliament

Below are summarised Answers to Questions in Parliament affecting transport. The Minister concerned and the date of the Answer are given in parentheses

Bus Fares

No increase in fare has been authorised on the bus service between Stroud and Oakridge, which serves Waterlane. The bus company recently gave instructions which resulted in passengers between Waterlane and Stroud being unable to obtain the benefit of the return fare between Oakridge and Stroud. The Regional Transport Commissioner is issuing to the company a direction which will make the return fare available to Waterlane passengers. (Mr. P. J. Noel-Baker, Joint Parliamentary Secretary, Ministry of War Transport, September 29).

Anti-Freeze Mixture

No arrangements are being made to enable civilians, where duties entitle them to a petrol allowance, to obtain anti-freeze for motor car radiators this winter. The supply of anti-freeze is so limited that it is possible to make it available only for private car users who cannot conveniently take alternative measures for protection against frost. Such private car owners should apply to the Regional Transport Commissioner in whose region the car is normally kept. (Mr. P. J. Noel-Baker, September 29).

Special Trains to and from Airports

I cannot accept the suggestion that the running of special trains to and from airports for British Airways passengers involve a waste of coal. They were authorised because the traffic could not economically or conveniently be carried by the ordinary trains. Apart from that consideration, the urgent importance of making the overseas Air Services as rapid and as reliable as possible will be recognised. They are not used for pleasure or recreation, and the running of special trains in connection with these overseas services cannot properly be compared with holiday services. (Mr. P. J. Noel-Baker, September 30).

Road Direction Signs

The replacement of road direction signs must depend upon military considerations. The subject is now being reviewed, and until the necessary decisions have been made, I regret I cannot add to my previous reply on September 11. (Mr. P. J. Noel-Baker, September 30).

Connections to Liverpool Docks

As a result of interim recommendations made by a committee under the Chairmanship of the Regional Transport Commissioner, certain improvements of railway connections to the Liverpool docks have been made and the establishment of parking places for road vehicles is under consideration. The committee did not propose that the Liverpool Overhead Railway should be closed. I understand that the Carters' & Motormen's Union did not tender evidence to the Committee. (Mr. P. J. Noel-Baker, September 30).

Transport of Deer Carcases

It has been arranged that special vans for the transport of deer carcases will be provided by the railways at selected loading stations on certain days of the week, and that the vans will be attached to passenger trains. On the day before the vans are required, the senders will tell the stationmasters at the loading points how many carcases they propose to send. The minimum load will be one ton each van. (Mr. P. J. Noel-Baker, September 30).

Road Haulage

When he decided to avail himself of the special knowledge and experience of Sir Frederick Heaton in the matter of road haulage, the Minister of War Transport did not ask him to conduct any formal investigation into the working of the existing scheme. Accordingly, Sir Frederick Heaton took no evidence from the Advisory Committee, and no report will be published. The Advisory Committee has always been at liberty to express its views on the working of the scheme direct to the Minister of War Transport. (Mr. P. J. Noel-Baker, September 30).

Notes and News

G. D. Peters & Co. Ltd.—Interim ordinary dividend is 7½ per cent. (same).

William Beardmore & Co. Ltd.—Interim dividend of 3 per cent. (same).

G.W.R. Dock Charges Order.—The Minister of War Transport on September 21 made the Great Western Railway Docks (Increase of Charges) Order, 1942.

Egyptian Delta Light Railways Limited.—No dividend has been declared on the 5½ per cent. cumulative preference shares for the year ended March 31, 1942.

Peruvian Corporation Limited.—Payment will be made on November 2 of 3 per cent. on the 6 per cent. first mortgage debentures in full discharge of Coupon No. 94, being interest due April 1, 1

Re-opening of St. Botolph's Station, Colchester.—The L.N.E.R. has announced that St. Botolph's Station, Colchester, was re-opened for traffic, with a normal train service, as from Monday, September 28. This station is the terminus of a short branch line.

State of Bahia South Western Railway Co. Ltd.—Payment of Coupon No. 55, due September 1, 1942, on the 6 per cent. first mortgage bonds is deferred and interest represented by such Coupon will therefore become payable out of the company's net profits in respect of subsequent financial years.

Irish Cross-Channel Rates.—In consequence of the increase by the Waterford Harbour Commissioners of charges made by them on merchandise and livestock traffic, the railway and steamship companies concerned have, as from October 1, made additional port charges on through and port to port rates for the conveyance of such traffic between Eire and Great Britain.

Railway Accident in Chile.—A collision, in which 9 persons were killed and 17 injured, occurred on July 29 on the Chilean State Railways. An electric train bound from Valparaiso to Santiago developed motor trouble shortly after leaving Llay-Llay Station, and, while stationary on a steep gradient in mountainous country, was run into from the rear by a goods train from Llay-Llay.

Waste Paper Recovery Competition.—More than 200,000 tons of waste paper were recovered during May, June, and July by local authorities competing in the Waste Paper Recovery Association's summer contest. Out of a possible 1,773 entrants, 1,292 local authorities took part. In the Borough Council Division, the £100 first prize was awarded to Holborn. This borough was in fact the runner-up in the contest, as the Corporation of London had agreed to enter the competition as pace-maker only; it collected nearly ten times as much as any other area.

Road Accidents in August, 1942.—The return issued by the Minister of War Transport of the number of persons reported to have died, or to have been injured, as a result of road accidents in Great Britain during the month of August last shows 502 deaths (compared with 732 in August, 1941), 2,900 seriously injured (compared with 4,199 in August, 1941), and 8,153 slightly injured (compared with 12,841 in August, 1941). There was an improvement in the road-accident figures dating from twelve months ago; this was marked particularly in June, July, and August, 1942, a period which coincided with the laying-up of many private cars.

Colvilles Limited.—Interim ordinary dividend on account of the year 1942 is 3 per cent. (same).

Thos. Firth & John Brown Limited.—Interim dividend of 4½ per cent., free of tax (same).

Derailment near Brookman's Park.—Twelve wagons of a coal train proceeding from Peterborough to Ferme Park became derailed between Brookman's Park and Hatfield early on October 5. No injuries were suffered. Some trains were diverted *via* Hertford between Stevenage and Wood Green, and single-line working was operated over the down relief line.

The Institute of Transport.—The first meeting of the 1942-43 session of the Institute of Transport was a lunch-hour informal meeting on Tuesday, October 6, at 1.15 p.m., at the Institution of Electrical Engineers, Victoria Embankment, London, W.C.2, when Mr. M. R. Bonavia opened a discussion on "The Theory and Practice of Railway Administration."

Canadian Pacific Railway.—Gross earnings for August, 1942, were $22,054,000 an increase of $2,064,000, and expenses were $18,834,000, or $1,990,000 higher. Net earnings, at $3,220,000, were $74,000 more than for August, 1941. For the first eight months of 1942 gross earnings amounted to $165,013,000, an increase of $25,824,000, and the net earnings of $28,437,000 were $2,176,000 greater than for the first eight months of 1942.

Diesel Locomotive Building in South Africa.—Now that Landsborough Findlay (S.A.) (Pty.) Limited has begun to construct diesel locomotives of various sizes and gauges at its Denver Works, Johannesburg, the Union is in a position to build and has built, heavy shunting engines for its own use and also small 1½-ton locomotives such as have been exported for a special 50-cm. gauge line in the Belgian Congo. It will be able also to supply other Southern African territories with shunting or light-railway locomotives of intermediate or other size.

Bolivia Railway Company.—Notice is given that the net earnings for the half-year ended June 30, 1942, are sufficient to pay interest of 1·031 per cent. on the 5 per cent. mortgage and collateral trust income bonds. The balance required to enable interest of 1½ per cent. (6*s.* on each £20 bond) to be paid on these bonds has been provided by the Antofagasta (Chili) & Bolivia Railway Company. A distribution is also announced of 1¼ per cent. (5s. on each £20 bond) to holders of the old first mortgage bonds who have not accepted the plan of reorganisation. Payments on both bonds were due on October 1.

Winter Preparations. — To meet possible extreme weather conditions during the coming winter snow-fighting arrangements have been reviewed and equipment has been overhauled. Four hundred snow ploughs are in service and ready for use. Patrol trains will be run throughout the night on exposed sections of line during snowstorms; special electric motor coaches, fitted with rail scrapers, wire brushes, and sprayers, will be used to clear conductor rails. Arrangements are in force for frozen points and signal rodding to be kept free with salt and other anti-freeze mixtures; at some places hose pipes will be connected to the injectors of locomotives to supply steam for de-freezing points. In the London area 1,400 electric "point-heaters" have been installed, and the compressed-air apparatus operating brakes and automatic doors will be kept free by the application of alcohol. Preparations have been made for supplementing equipment for clearing snow rapidly from goods yards, sidings, and terminals; 5,000 shovels have been provided at key points, and supplies of salt are held. Steps have been taken also to purchase snow ploughs suitable for use with motor vehicles: six were delivered early in this year and a further 23 are on order. To economise in fuel, the braziers

British and Irish Railway Stocks and Shares

Stocks	Highest 1941	Lowest 1941	Prices Oct. 2, 1942	Prices Rise/Fall
G.W.R.				
Cons. Ord.	43¾	30¾	49½	+ 2
5% Con. Pref. ...	109½	83½	107½	+ ½
5% Red. Pref. (1950)	105½	96½	105	—
5% Rt. Charge ...	129½	116	126½	+ 1
5% Cons. Guar ...	128	110½	123	—
4% Deb.	113½	102½	109	—
4½% Deb.	115	105⅝	110½	—
4½% Deb.	121⅛	112	115½	—
5% Deb.	132	122	127½	—
2½ Deb.	70	62⅛	75½	—
L.M.S.R.				
Ord.	17¼	11	24	+ ½
4% Pref. (1923) ...	53	33½	60	+ 2
4% Pref.	68½	48½	75	+ 1
5% Red. Pref. (1955)	97⅜	77	99½	—
4% Guar.	100	85¼	99½	+ ½
4% Deb.	105¼	97	104	—
5% Red. Deb. (1952)	110½	106½	109½	—
L.N.E.R.				
5% Pref. Ord. ...	3¾	2⅜	5½	+ ½
Def. Ord. ...	2	1½	3½	+ ½
4% First Pref. ...	52½	33	58	+ 1½
4% Second Pref. ...	19⅜	10	27	+ 1½
5% Red. Pref. (1955)	79½	52	90½	+ 1
4% First Guar. ...	90½	74½	93	+ 1
4% Second Guar. ...	80½	59	85	+ 1
3% Deb.	79½	68¾	79	—
4% Deb.	104	91¼	103	—
5% Red. Deb. (1947)	106	102½	104½ §	—
4½% Sinking Fund Red. Deb.	103½	99 11/16	104½	+ 1
SOUTHERN				
Pref. Ord.	65½	43½	70	+ 1
Def. Ord.	15⅞	9	19½	+ 1
5% Pref.	107	77½	105½	—
5% Red. Pref. (1964)	107	89½	107½	—
5% Guar. Pref. ...	128	111	123	—
5% Red. Guar. Pref. (1957)	114¾	107¼	110½	—
4% Deb.	112	102½	107½	—
5% Deb.	130½	119	126½	—
4% Red. Deb. (1962–67)	108½	102	108½	—
4% Red. Deb. (1970–80)	108¾	102½	108	—
FORTH BRIDGE				
4% Deb.	99¾	90½	107	—
4% Guar.	99	85½	103½	—
L.P.T.B.				
4½% "A"	120 3/16	109½	115½	—
5% "A"	130½	115½	124½	—
4½% "T.F.A." ...	103½	99½	101	+ 1
5% "B"	117	102	114½	—
"C"	46¾	28¾	48	—
MERSEY				
Ord.	24¾	19½	23	—
3% Perp. Pref. ...	58	51½	59	—
4% Perp. Deb. ...	100	90	99	—
3% Perp. Deb. ...	73½	63	77	—
IRELAND				
BELFAST & C.D.				
Ord.	4	4	9	—
G. NORTHERN				
Ord.	14½	3	24½	+ 1½
G. SOUTHERN				
Ord.	14½	5	15	—
Pref.	17	10	21	—
Guar.	44	16	43½	— ½
Deb.	61	42	64	+ 1

OFFICIAL ADVERTISEMENTS

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is 9.30 a.m. on the preceding Monday. All advertisements should be addressed to :—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

OFFICIAL NOTICES

The Institute of Transport Examinations, 1943

THE Graduateship and Associate Membership Examinations will, circumstances permitting, be held in London and at other centres on Monday, Tuesday and Wednesday, May 3rd, 4th, and 5th, 1943.

The latest date for the deposit of forms of entry is March 31st, 1943. Full particulars, previous question papers (price 7d. per set, post free) and copies of the guide to reading for subjects of the examinations (price 1s. 2d. post free) may be obtained from the undersigned.

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necessary to assist in keeping locomotive water supplies from freezing are being supplied with sawdust.

Churchill Machine Tool Co. Ltd.—Interim dividend of 15 per cent., less tax, on the ordinary shares on account of the year to December 31, 1942, the same as a year ago.

First Class Long-Distance Travel.—The Ministry of War Transport has stated that reports that the abolition of first-class travelling is to be extended to day travel throughout the country are incorrect.

U.S. Railway Accident.—Reuters reports that the Baltimore & Ohio Railroad announced on October 2 that the total number of persons killed as the result of the recent accident (recorded in our October 2 issue) near Dickerson, Maryland, was fourteen.

Belgian National Railways.—According to an announcement issued recently by the Belgian National Railways, the amount of shares to be redeemed up to September 1, 1943, has been fixed at frs. 69,000,000. No foreign-owned shares are to be redeemed for the time being; the amortization of foreign branches of the share capital was discontinued after the occupation of Belgium.

Snowdon Railway.—The Snowdon Mountain Railway, which was opened on Easter Monday, completed its operating season on Saturday, September 26. There were interruptions on some days by reason of weather conditions, but, on the whole, the management regards the past summer as a very good season, and considerably better than the previous year. Many hundreds of passengers have been conveyed up Snowdon, and more visitors have stayed at the modernised Summit Hotel this year than in peacetime.

Magdeburg Trams.—In respect of the year 1941, the Magdeburg trams recorded an increase of 18·9 per cent. in the number of passengers, compared with a rise of 12·2 per cent. a year earlier. The increases of the traffic receipts were 17·7 per cent. and 10·5 per cent. respectively. The bus services operated at a loss. A dividend of 4 per cent. (5 per cent. for 1940) was paid on the share capital of RM. 4,500,000. The company's plant was valued at RM. 20,870,000 at the end of 1941, compared with RM. 20,160,000 a year previously, including RM. 2,360,000 (RM. 2,190,000) in respect of lines under construction.

Buenos Aires Central Railway.—Traffic receipts for the week ended August 8, 1942, were $124,600, a decrease of $1,100 on the corresponding week of 1941. Receipts for the six weeks from July 1 were $669,400, a decrease of $31,600 on last year.

Institution of Electrical Engineers.—The benevolent fund of the Institution of Electrical Engineers has received from Lord Hirst, Chairman of the General Electric Co. Ltd., a gift of £20,000, from which assistance will be given to persons or their dependants, who have rendered important services in the electrical fields of science, industry, or engineering.

Trelleborg-Sassnitz Ferries.—A Swedish State Railways committee has entered into discussions with the Reichsbahn for the replacement of the present ferry steamers on the Trelleborg-Sassnitz route. There are at present four ships in service, all acquired in 1909, but, as their accommodation is insufficient and their operation uneconomical, replacement by modern vessels is stated to be overdue.

Completion of World's Highest Ropeway.—It was announced in a recent press message that the world's highest ropeway, connecting Chamonix, in the French Alps, south of the Lake of Geneva, with the top of the Aiguille du Midi, completed recently, would be opened in a few days. The length of the ropeway is about 12,000 ft. The inaugural journey was to be made conveying a very large telescope lens to the top of the mountain, where a meteorological observatory has been erected.

Società per le Ferrovie Adriatico-Appennino, of Milan.—This railway company recently absorbed the Società della Ferrovia ed Autolinee di Chieti (also of Milan), with a share capital of 1,000,000 lire, and increased its own share capital from 5,200,000 lire to 6,200,000 lire. The Società per le Ferrovie Adriatico-Appennino owns and operates the 35-mile line connecting Porto San Giorgio (on the Adriatic, to the south of Ancona) with Amandola *via* Fermo; the company's traffic-management office is at the latter place. The company absorbed owned and operated a system of motor services over a length of 270 miles in Chieti Province, further south on the Adriatic coast.

Talks to the Troops.—By arrangement with the London Regional Committee for the Adult Education of H.M. Forces Mr. Harold G. Davis has given over a hundred railway talks to members of the Army and Air Force and in the course of his lectures has addressed audiences totalling in the aggregate over 7,000. His lectures deal with the activities of the four main-line railways and the London Passenger Transport Board. The lectures are illustrated by film-slides or lantern slides, and the most popular subjects are "Railway Engineering Wonders," "Electrification of Railways," and "Railways and the Economic Life of Britain." On one occasion an R.A.F. Unit designed a special poster to welcome Mr. Davis, and other units have asked for repeat visits up to four times. Lectures have also been given to members of the Forces at convalescent homes and hospitals. Requests for speakers and talks on behalf of the British railways should be addressed to Mr. John R. Hind, British Railways Press Office, Waterloo Station, London, S.E.1.

Institute of Transport Examinations.—The graduateship and associate membership examinations will, circumstances permitting, be held in London and at other centres on May 3, 4, and 5, 1943. The latest date for the deposit of forms of entry is March 31, 1943. Full particulars, previous question papers (price 7d. each set, post free) and copies of the guide to reading for subjects of the examinations (price 1s. 2d. post free) may be obtained from the undersigned, Mr. F. W. Crews, the Secretary, Institute of Transport, 15, Savoy Street, London, W.C.2.

Contracts and Tenders

The following contracts have recently been placed by the Egyptian State Railways :—

Midland Electrical Mfg. Co. Ltd. : Fuse units.

Holden & Brooke Limited, Richard Klinger Limited, Gresham & Craven Limited, and Vacuum Brake Co. Ltd. : Spares for steam railcars.

Vacuum Oil Co. Ltd. : Sight feed glasses.

Callenders Cable & Construction Co. Ltd., and W. T. Glover & Co. Ltd. : Copper cable.

British Insulated Cables Limited : Cords and wire.

Alliance & Survey Wholesale Limited : Eureka wire.

The General Electric Co. Ltd. : Cable.

Caprotti Valve Gears Limited : Caprotti spares.

Sherwoods Limited : Brass burners, and flame spreader.

Tearne & Sons Ltd. : Transfers.

Thomas Bolton & Sons Ltd. : Non-ferrous metals.

The first 75 flat wagons, of an order of 300 from the Turcot plant of the Canadian Car & Foundry Co. Ltd. have been placed into service by the Canadian National Railways. These 50-ton all-steel wagons, which are in heavy demand for the movement of war freights, have an overall length of 52 ft., and are of the fish-belly centre and side-sill type.

Railway Stock Market

Despite last week's advance in security values, there has been no appreciable profit-taking in Stock Exchange markets. In fact, in many directions demand has shown further expansion due to the search for investments giving attractive yields, and as the market is none too well supplied with stock, prices responded strongly in many directions, and in numerous instances, reached their best levels since 1938. Movements in first class investment stocks were moderate in comparison, but the undertone in British Funds was firm. Yield considerations continued to centre a good deal of attention on home railway junior stocks, and sentiment has remained under the influence of prevailing views as to the assured dividend position under the financial agreement, and assumptions as to post-war developments. The recent rise has been substantial, but current yields are still considerably above those offered by any other group of active securities.

Indications have not been lacking of a broadening of activity in the home railway market, and gains of half-a-point ruled among debentures as well as guaranteed and senior preference stocks. It is, of course, realised that the latter offer not unattractive yields, bearing in mind their investment merits and the fact that interest payments can be considered as being virtually guaranteed by the Government until at least one year after the war. In many cases home railway stocks are now at their best level since 1938, but only in the case of L.N.E.R. second preference has the current price exceeded the highest level recorded in that year. In some instances, particularly Great Western and Southern preference stocks, prices are well below the 1938 highest, and as to L.M.S.R. 1923 preference, now 60½, the highest in 1938 was 70¼. Moreover, in the case of Southern preferred, the best level in that year was 87, or 16 points above the present price. The accompanying table gives particulars as to highest prices in 1941 as well as in 1938, together with current prices.

	1941 high	1938 high	Current price
G.W.R. con. ord. ...	43⅜	65½	51
,, 5% con. pref. ...	109½	118⅝	108
,, 4% deb. ...	113½	111	109½
,, 5% con. guar. ...	128	128½	123½
L.M.S.R. ord.	17¼	30½	25
,, 4% pref. (1923)	53	70¼	60½
,, 4% pref. ...	68½	82½	75
,, 4% deb. ...	105⅜	105⅛	104
,, 4% guar. ...	100	102⅜	100
L.N.E.R. pref. ord. ...	3⅜	8 7/16	5⅜
,, def. ord. ...	2	4 1/16	3¼
,, 4% 1st pref. ...	52½	68½	59
,, 4% 2nd pref. ...	19⅜	27½	28½
,, 4% 1st guar. ...	90½	97½	93½
,, 4% 2nd guar. ...	80½	91½	85½
,, 4% deb. ...	104	104½	103
Southern pref. ord. ...	65½	87	71
,, def. ord. ...	15⅝	21⅜	21⅛
,, 5% pref. ...	107	116	106½
,, 5% guar. pref.	128	128½	123½
,, 4% deb. ...	112	109½	108½
L.P.T.B. "C"	46½	84	48¾

Great Western ordinary has risen to 51, which compares with 48 a week ago. Moreover, at 123½ and 109½ respectively, Great Western guaranteed and debenture stocks each gained half-a-point, and the 5 per cent. preference stock was a point better at 108. L.N.E.R. stocks were in good demand; the first preference was two points higher at 59, and the second preference rose further from 25⅜ to 28½; the guaranteed stocks were also better. L.M.S.R. ordinary has moved up further from 23⅜ to 25, and the senior preference gained a point, the 1923 preference 1½ points, and the guaranteed stock half-a-point. Southern deferred rose further from 19 to 21⅛, the preferred from 69½ to 71, the preference stock from 105½ to 106½, and the 4 per cent. debentures from 108 to 108½. London Transport "C" was 48¾, compared with 48 a week ago.

Moderate gains were shown in Argentine railway securities, and a little speculative buying of the ordinary stocks also appeared to be in progress. Elsewhere, United of Havana debentures were again higher and Leopoldina debentures improved, and San Paulo ordinary was better. Canadian Pacific issues were higher on balance, under the influence of the traffic receipts.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open 1941–42	Week Ending	Traffic for Week: Total this year	Traffic for Week: Inc. or Dec. compared with 1941	No. of Weeks	Aggregate Traffics to date: Totals: This Year	Aggregate Traffics to date: Totals: Last Year	Aggregate Traffics to date: Increase or Decrease	Shares or Stock	Prices: Highest 1941	Prices: Lowest 1941	Prices: Oct. 2, 1942	Prices: Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	27.9.42	27,640	— 800	39	818,600	732,930	+ 85,670	Ord. Stk.	10⅞	3 11/16	11	Nil
	Argentine North Eastern ...	753	29.9.42	14,088	+ 1,788	13	173,706	157,662	+ 16,044	,,	4	1	5½	Nil
	Bolivar	174	Aug., 1942	3,790	— 60	34	35,191	30,717	+ 4,474	6 p.c. Deb.	5	5	12½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds	8	2 1/16	16	Nil
	Buenos Ayres & Pacific ...	2,807	26.9.42	94,680	+ 23,700	13	1,086,360	1,004,040	+ 82,320	Ord. Stk.	7⅜	1½	5	Nil
	Buenos Ayres Great Southern	5,080	26.9.42	140,640	+ 1,680	13	1,620,960	1,603,560	+ 17,400	Ord. Stk.	10⅜	3½	9	Nil
	Buenos Ayres Western ...	1,930	26.9.42	51,960	— 8,280	13	623,940	616,080	+ 7,860	,,	9	2½	7½	Nil
	Central Argentine	3,700	26.9.42	125,034	+ 6,870	13	1,565,673	1,401,480	+ 164,193	,,	8½	2⅝	6½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	9½	½	3¼	Nil
	Cent. Uruguay of M. Video...	972	26.9.42	21,519	— 2,381	13	254,219	278,923	— 24,704	Ord. Stk.	9½	1	5½	Nil
	Costa Rica	262	Aug., 1942	13,927	— 9,056	5	26,688	47,559	— 20,871	Stk.	15½	11½	13½	Nil
	Dorada	70	Aug., 1942	19,930	+ 7,480	35	118,405	100,730	+ 17,655	1 Mt. Db.	97	97	88½	6½
	Entre Rios	808	26.9.42	20,616	+ 3,432	13	228,474	233,814	— 5,340	Ord. Stk.	6½	½	6	Nil
	Great Western of Brazil ...	1,030	26.9.42	13,200	+ 3,600	39	389,200	345,300	+ 43,900	Ord. Sh.	11/-	1/-	1	Nil
	International of Cl. Amer. ...	794	Aug., 1942	$298,195	— $106,623	34	$4,308,750	$3,889,669	+ $419,081	—	—	—	—	—
	Interoceanic of Mexico ...	—	—	—	—	—	—	—	—	1st Pref.	⅜	6d.	1½	Nil
	La Guaira & Caracas... ...	22¾	Aug., 1942	9,825	+ 1,245	34	54,765	51,825	+ 2,940	—	—	—	—	—
	Leopoldina	1,918	19.9.42	29,936	+ 977	38	1,131,351	960,607	+ 161,744	Ord. Stk.	4	½	4½	Nil
	Mexican	483	21.9.42	ps. 221,200	— ps. 52,500	13	ps. 3,361,100	ps. 3,635	— ps. 274,200	,,	⅜	¼	½	Nil
	Midland of Uruguay	319	July, 1942	11,961	— 2,549	4	11,961	14,510	— 2,549	—	—	—	—	—
	Nitrate	382	30.9.42	7,899	+ 1,751	25	140,095	107,301	+ 32,794	Ord. Sh.	66/-	1 1/16	68½	3 7/16
	Paraguay Central	274	25.9.42	$3,252,000	+ $332,000	13	$47,175,000	$43,376,000	+ $3,799,000	Pr. Li. Stk.	43	29	47½	12⅜
	Peruvian Corporation ...	1,059	Aug., 1942	85,805	+ 14,147	9	165,606	137,208	+ 28,398	Pref.	6½	1 1/16	14½	Nil
	Salvador	100	July, 1942	c 79,000	— c 14,921	4	c 79,000	c 64,079	+ c 4,921	—	—	—	—	—
	San Paulo	153½	13.9.42	37,876	+ 5,776	37	1,342,611	1,371,908	— 29,297	Ord. Stk.	52	24½	53½	3½
	Taltal	160	Aug. 1942	5,235	— 750	8	11,725	9,165	+ 2,560	Ord. Sh.	1	6/-	1 1/16	Nil
	United of Havana	1,346	26.9.42	44,458	+ 26,897	13	495,940	248,599	+ 247,341	Ord. Stk.	2½	⅛	4¼	Nil
	Uruguay Northern	73	July, 1942	1,137	— 220	4	1,137	1,357	— 220	—	—	—	—	—
Canada	Canadian National	23,562	21.9.42	1,649,600	+ 379,200	38	52,076,400	42,368,000	+ 9,708,000	—	—	—	—	—
	Canadian Pacific	17,049	21.9.42	1,053,800	+ 138,200	38	36,017,400	30,486,200	+ 5,351,200	Ord. Stk.	13 3/16	7⅛	11½	Nil
India†	Barsi Light	202	July, 1942	23,685	+ 8,903	17	63,285	67,635	— 4,350	—	—	—	—	—
	Bengal & North Western ...	2,090	July, 1942	261,600	— 5,267	18	1,080,300	1,092,128	— 11,828	Ord. Stk.	345	253	349½	5½
	Bengal-Nagpur	3,267	20.6.42	284,100	+ 31,301	11	2,271,525	2,107,876	+ 163,649	,,	101	95⅜	96	4 7/16
	Madras & Southern Mahratta	2,939	30.6.42	212,550	+ 3,338	13	1,945,373	1,858,963	+ 86,404	,,	105 7/16	101½	100	7⅛
	Rohilkund & Kumaon ...	571	July, 1942	58,275	— 3,099	18	234,300	272,651	— 38,351	,,	342	290	251½	4 7/16
	South Indian	2,402	20.6.42	179,171	+ 43,616	12	1,376,295	1,113,057	+ 263,238	,,	100	87	98	4⅛
Various	Beira	204	July, 1942	71,494	—	43	743,603	—	—	—	—	—	—	—
	Egyptian Delta	607	10.8.42	11,442	+ 3,483	20	139,046	89,984	+ 49,062	Prf. Sh.	1½	29/-	3	Nil
	Manila	—	—	—	—	—	—	—	—	B. Deb.	68	45	37½	9 7/16
	Midland of W. Australia ...	277	July, 1942	27,869	+ 9,221	52	27,869	18,648	+ 9,221	Int. Deb.	90½	86½	89½	6
	Nigerian	1,900	25.7.42	70,391	+ 19,240	18	924,271	910,397	+ 13,914	—	—	—	—	—
	Rhodesia	2,442	Jul , 1942	525,348	—	43	4,831,449	—	—	—	—	—	—	—
	South Africa	13,291	22.8.42	778,597	+ 10,795	21	16,034,688	15,279,983	+ 754,705	—	—	—	—	—
	Victoria	4,774	Mar., 1942	1,339,304	+ 366,183	37	10,425,476	8,391,343	+ 2,034,133	—	—	—	—	—

Note. Yields are based on the approximate current prices and are within a fraction of 1/16. Argentine traffics are given in sterling and are calculated @ 16⅔ pesos to the £. † Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend